Kew. QK1 .B952 1915

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

1915.

LONDON:
PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S
STATIONERY OFFICE
By JAS. TRUSCOTT and SON, Ltd., Cannon Street, E.C.

To be purchased, either directly or through any Bookseller, from
WYMAN and SONS, Limited, 29, Breams Buildings, Fetter Lane, E.C.,
and 54, St. Mary Street, Cardiff; or
H.M. STATIONERY OFFICE (Scottish Branch),
23, Forth Street, Edinburgh; or
E. PONSONBY, Limited, 116, Grafton Street, Dublin;
or from the Agencies in the British Colonies and Dependencies,
the United States of America and other Foreign Countries of
T. FISHER UNWIN, Limited, London, W.C.

1915.

Price 4*s.* 6*d.*

MISSOURI BOTANICAL
GARDEN LIBRARY

THE SEPARATE NUMBERS OF THIS VOLUME WERE PUBLISHED ON THE FOLLOWING DATES—

No. 1 ... ... March 9.

No. 2 ... ... March 27.

No. 3 ... ... April 26.

No. 4 ... ... June 4.

No. 5 ... ... July 26.

No. 6 ... ... August 17.

No. 7 ... ... September 13.

No. 8 .. .. October 8.

No. 9 ... ... December 8.

No. 10 ... ... December 24.

CONTENTS.

No.	Article.	Subject.	Page.
1	I.	The Genus Thesium in South Africa (with plates)	1
,,	II.	Diagnoses Africanae: LXII.	44
,,	III.	Miscellaneous Notes	49
2	IV.	Diospyros Ebenaster	65
,,	V.	The South African Sections of Loranthus ...	67
,,	VI.	The Selection of Cocoanuts for Germination	72
,,	VII.	Diagnoses Africanae: LXIII.	76
,,	VIII.	The Care of Old Trees (with plates and fig.)	82
,,	IX.	Decades Kewenses: LXXXIV.	88
,,	X.	Miscellaneous Notes	94
3	XI.	Notes on South African Santalaceae... ...	97
,,	XII.	Fomes juniperinus and its occurrence in British East Africa (with fig.)	102
,,	XIII.	Blister Disease of Fruit Trees (with plate) ...	104
,,	XIV.	Some Chinese Marine Algae	107
,,	XV.	Decades Kewenses: LXXXV.	113
,,	XVI.	Miscellaneous Notes	118
4	XVII.	Some additional Species of Meconopsis (with plates)	129
,,	XVIII.	Cornus Nuttallii and its Allies (with plates)	177
,,	XIX.	The Uses of Cornus Wood	179
,,	XX.	Miscellaneous Notes	181
5	XXI.	Sansevieria (with plates and figs.)	185
,,	XXII.	Miscellaneous Notes	261
6	XXIII.	Coniferous Timbers	265
,,	XXIV.	Walter Hood Fitch, Botanical Artist ...	277
,,	XXV.	The Genus Phelipaea (with plate)	285
,,	XXVI.	Thyrsopteris elegans (with plate)	295
,,	XXVII.	The South African Camphor Tree	297
,,	XXVIII.	The Arboretum at Tortworth	298
,,	XXIX.	The Black Alder for Gunpowder	304
,,	XXX.	Miscellaneous Notes	306
7	XXXI.	New Tropical African Species of Ficus (with figs.)	313
,,	XXXII.	Decades Kewenses: LXXXVI.	344
,,	XXXIII.	Sir James Murray	350
,,	XXXIV.	Miscellaneous Notes	355
8	XXXV.	Fungi from Australia and New Zealand (with plates)	361
,,	XXXVI.	Dawyck	376
,,	XXXVII.	Ceanothus rigidus (with figs.)...	379
,,	XXXVIII.	Iburu and Fundi, two Cereals of Upper Guinea (with figs.)	381
,,	XXXIX.	Diagnoses Africanae: LXIV.	386
,,	XL.	Miscellaneous Notes	389
9	XLI.	Some New Species from Burma	393
,,	XLII.	Mimosa caesia and M. Intsia	407
,,	XLIII.	Miscellaneous Notes	411

No.	Article.	Subject.	Page.
10	XLIV.	John Medley Wood	417
,,	XLV.	Contributions to the Flora of Siam	419
,,	XLVI.	Orophea polycarpa and Artabotrys burmanicus	433
,,	XLVII.	Miscellaneous Notes	435
Appendix I.	—	List of seeds of hardy herbaceous plants and of trees and shrubs	1
,, II.	—	Catalogue of the Library. Additions received during 1914	27
,, III.	—	New garden plants of the year 1914	57
,, IV.	—	Botanical Departments at home and in India and the Colonies	85

Errata.

Page 23, line 18 from top, *for* A.D.C. *read* A.DC.

Page 39, line 25 from top, *for* Karkamo *read* Kharkams.

Page 64, line 7 from top, *for* Campsler *read* Campster.

Page 64, line 9 from top, *for* Campsl. *read* Campst.

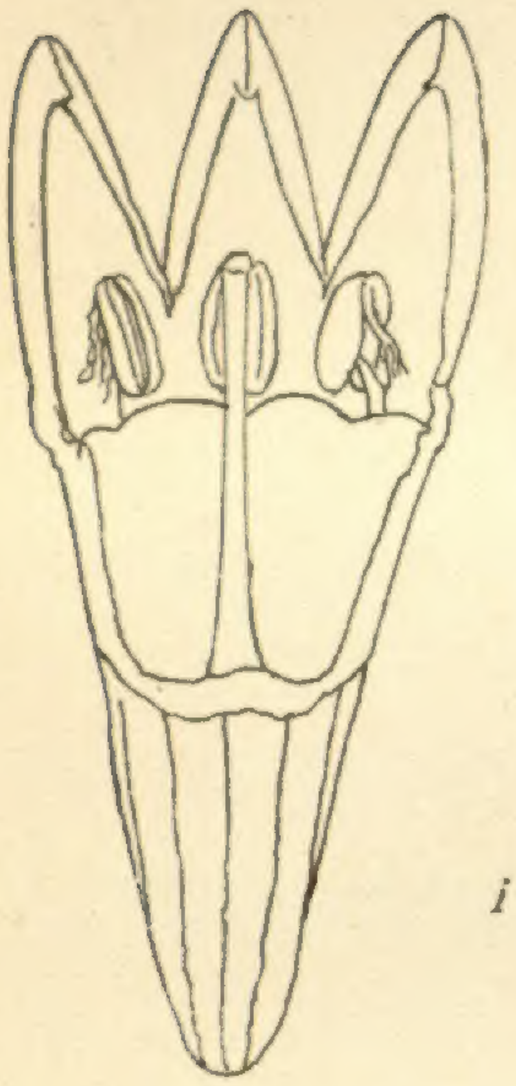
Page 188, *for* final paragraph, lines 1-7 from base, *read* as follows:—

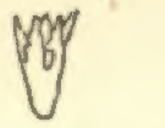
One of the most interesting characteristics of this genus is the very remarkable change which takes place in the form of the leaves of many of the species as the plant advances from the juvenile to the adult stage. When seeds of any of the species having cylindric leaves in the adult state are sown, the seedling plants invariably have moderately thin flattened or concave leaves, which spread widely in a lax rosette. As the seedling

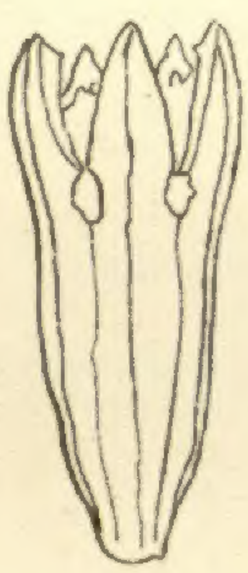
Page 252, line 4, *for* fig. 23, *read* fig. 21.

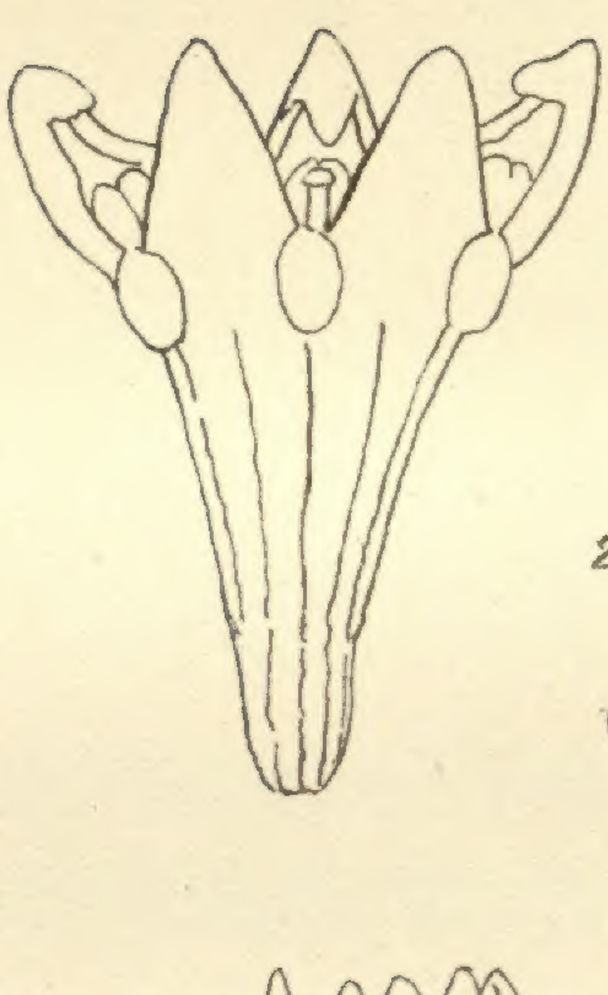
Page 252, line 16, *for* fig. 24, *read* fig. 22.

Page 254, line 12, *for* fig. 25, *read* fig. 23.

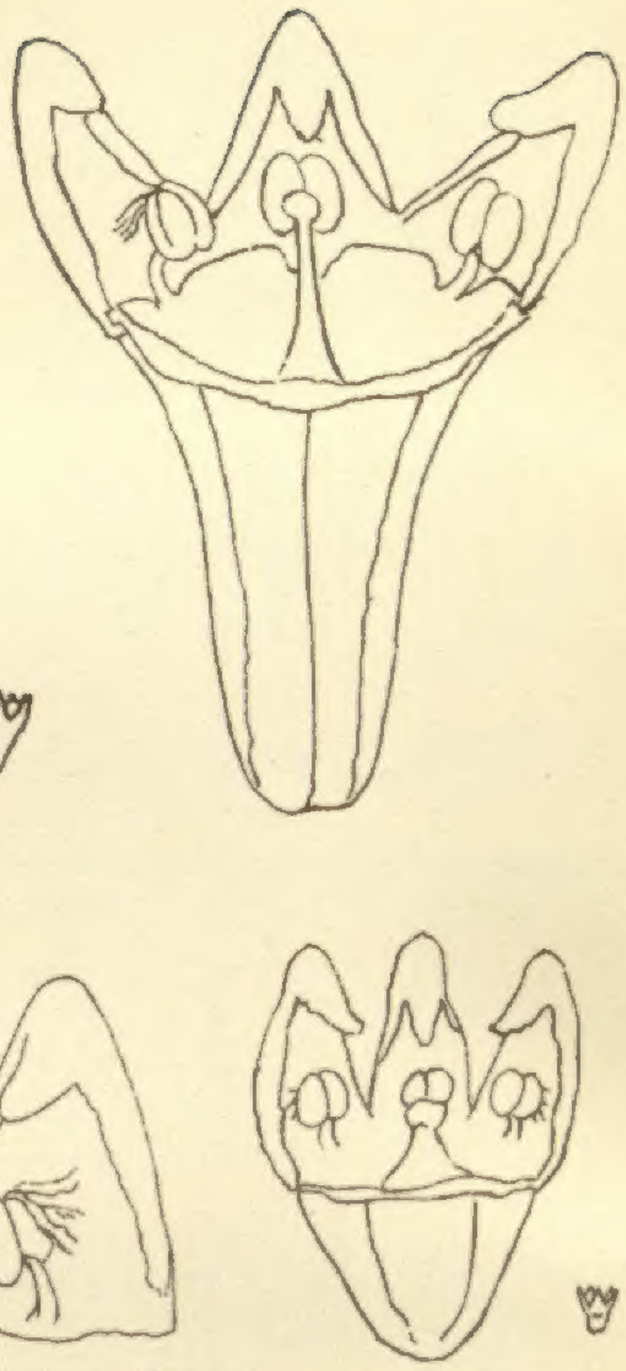


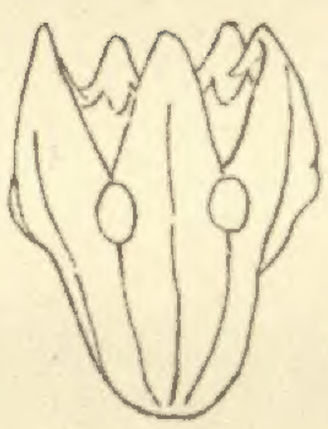




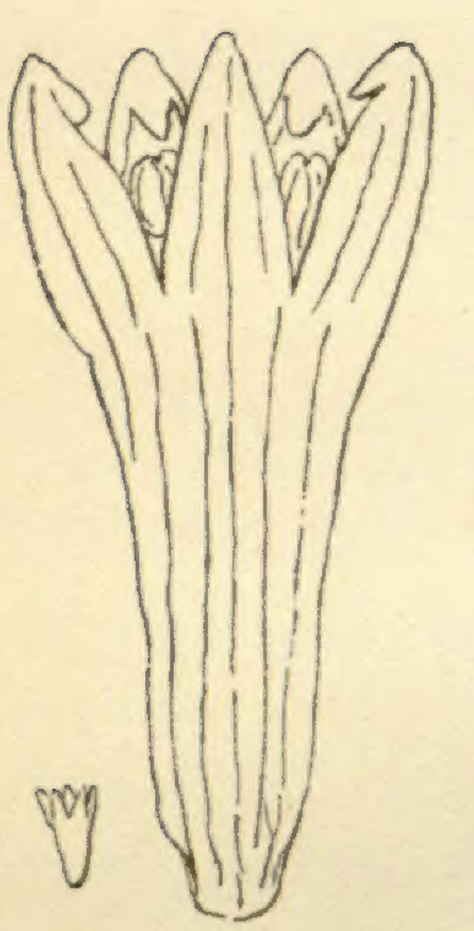


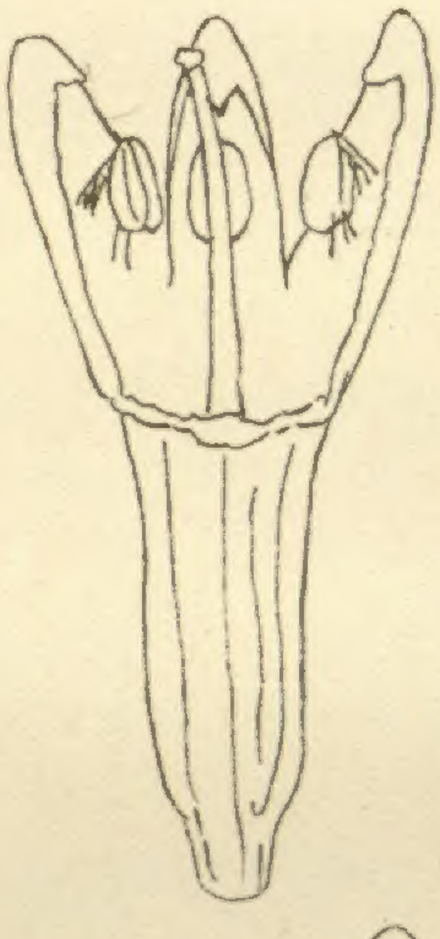
2



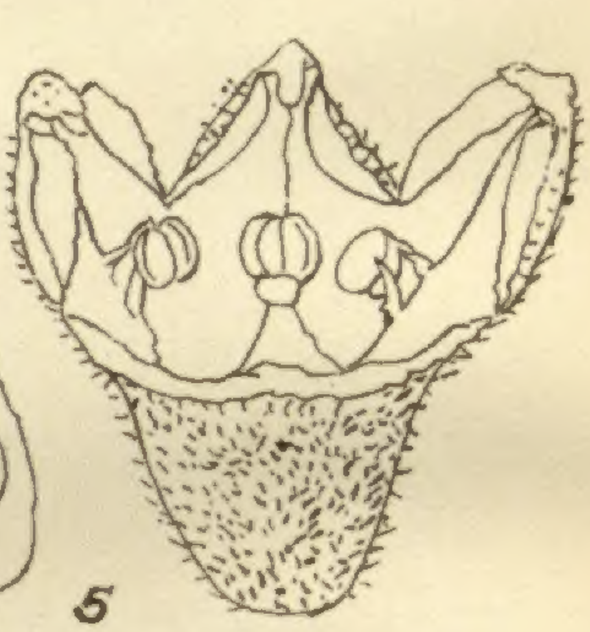


3

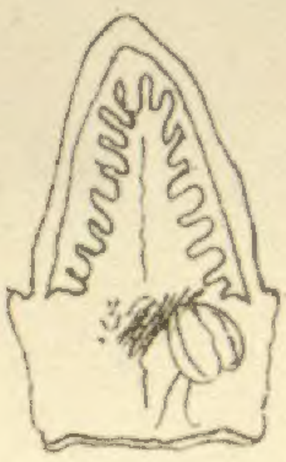




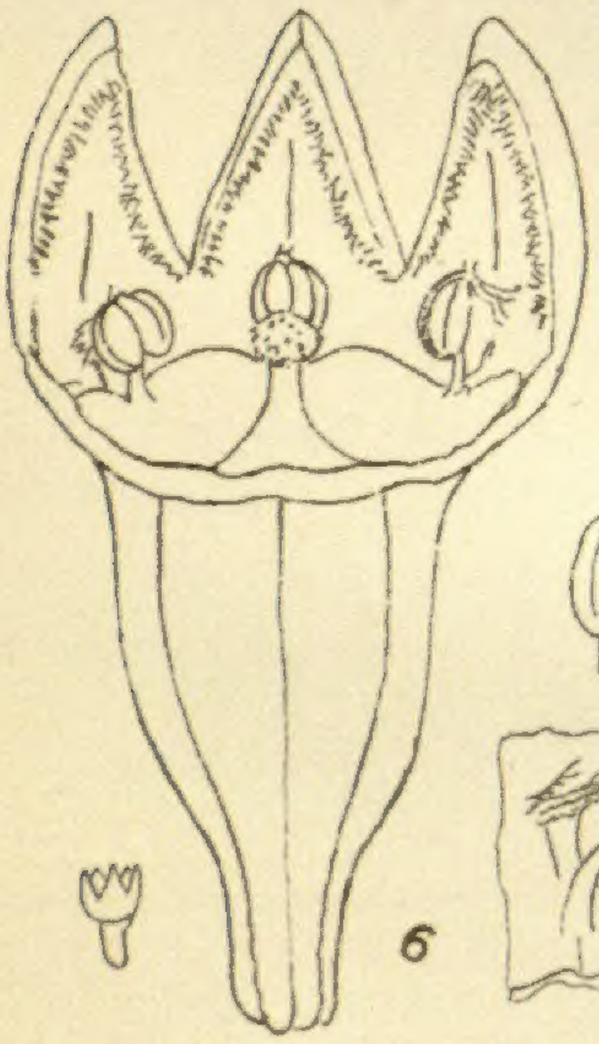
4

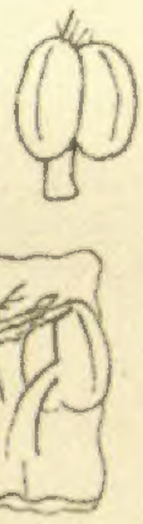


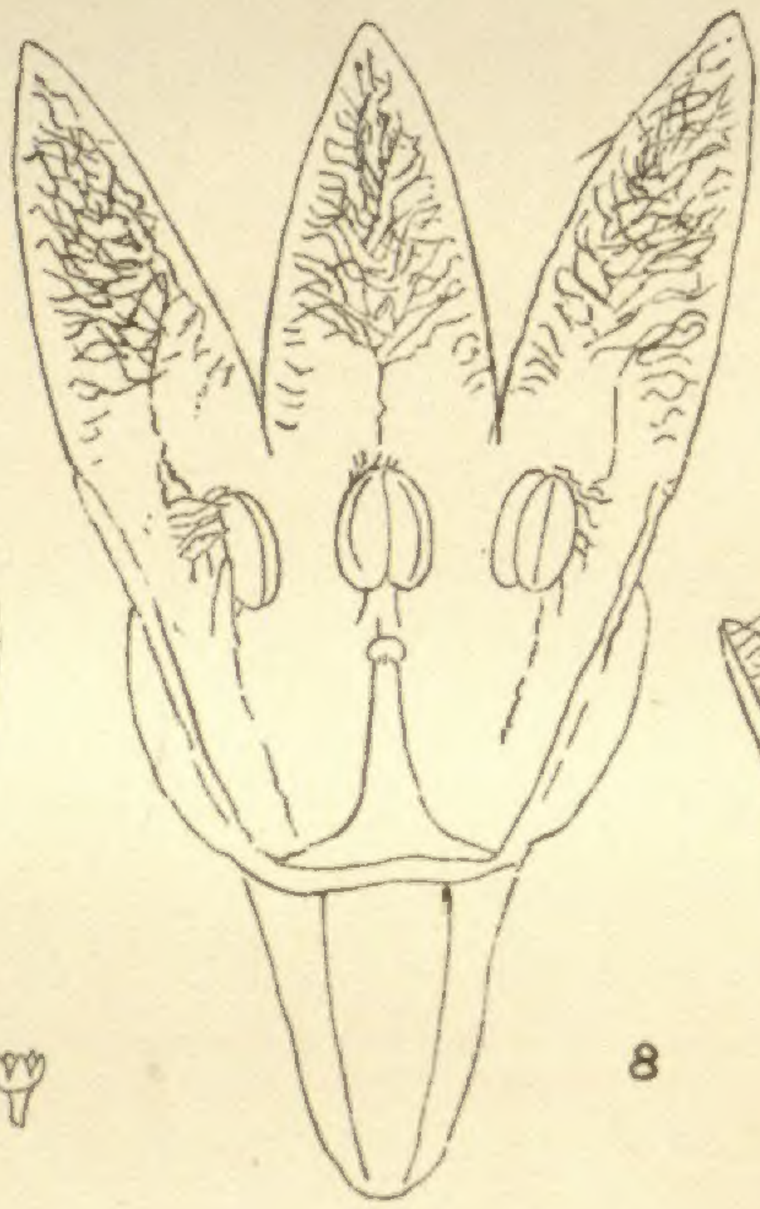
5

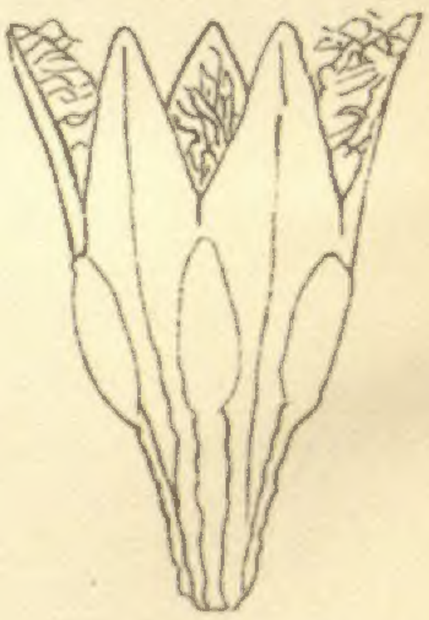


7









6

7

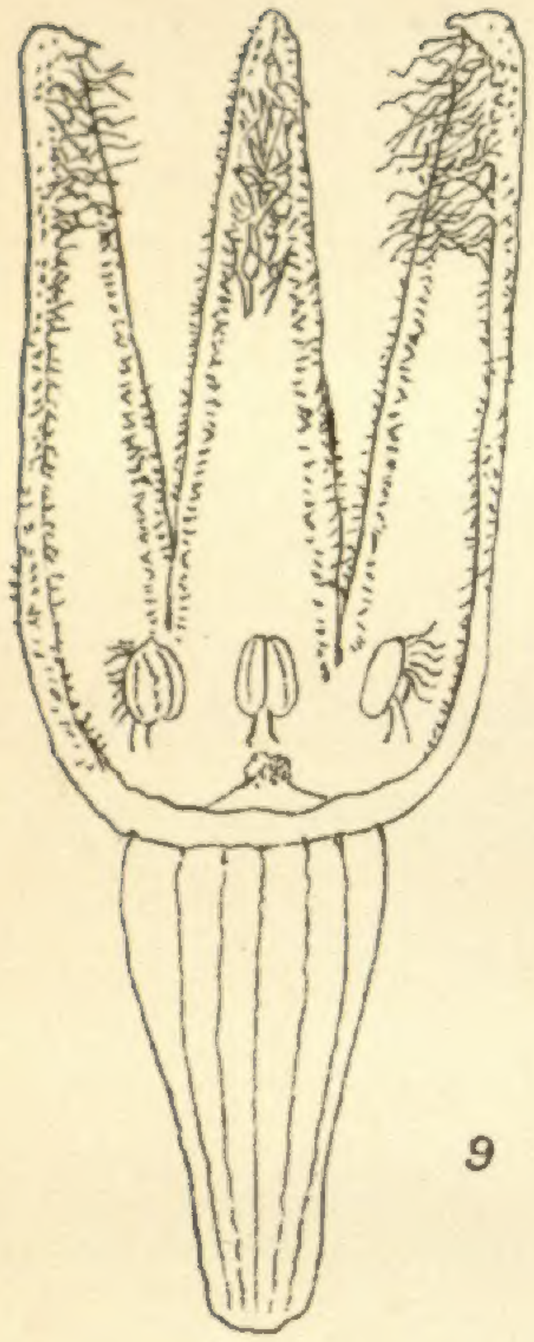
8

M. S. del.

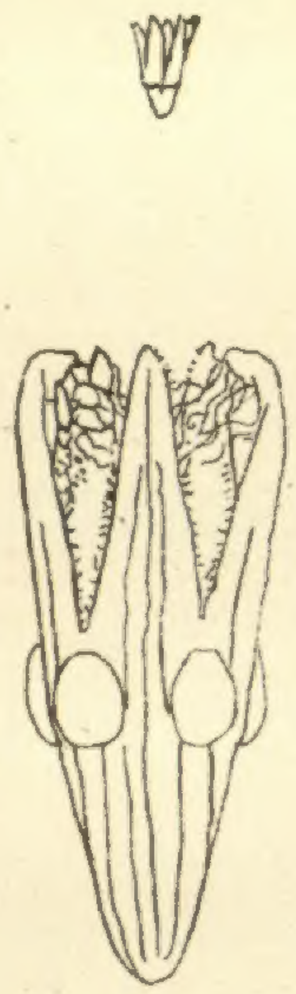
Floral Types in Thesium.

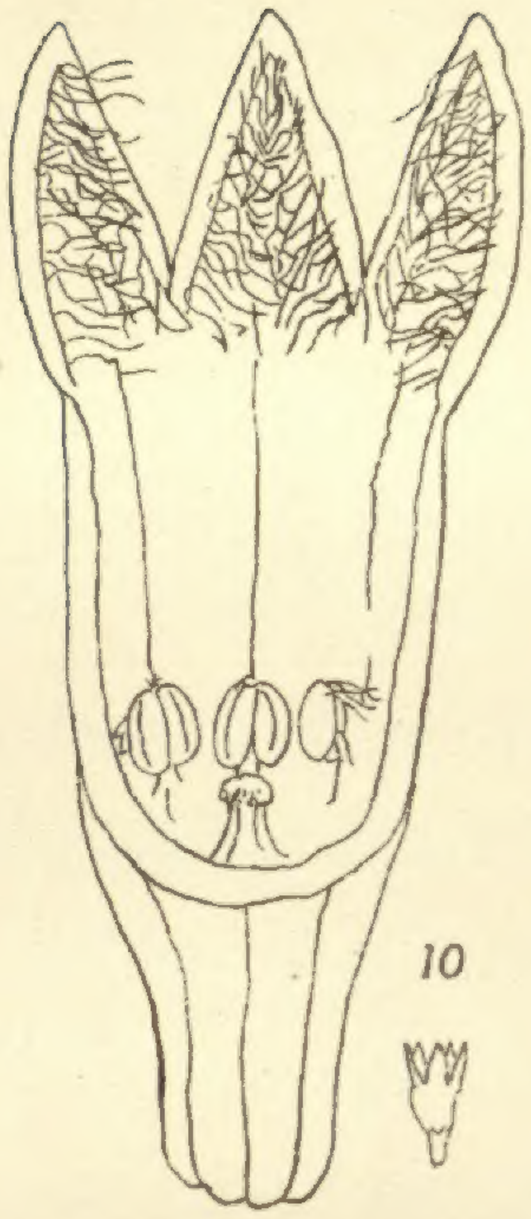
3521. 225.595. 1150.2.15.

Malby&Sons.Lith.

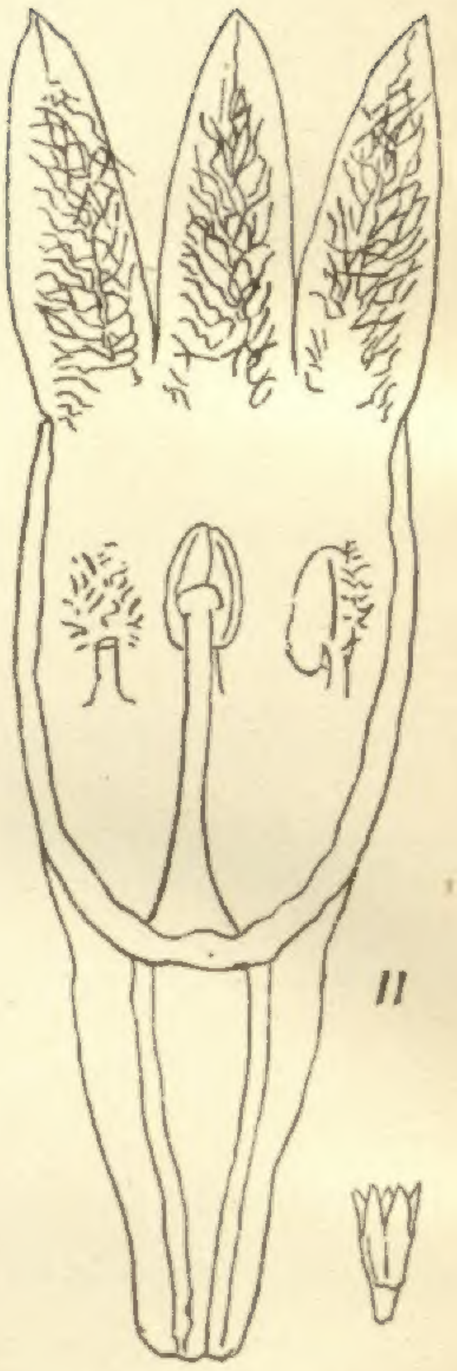


9





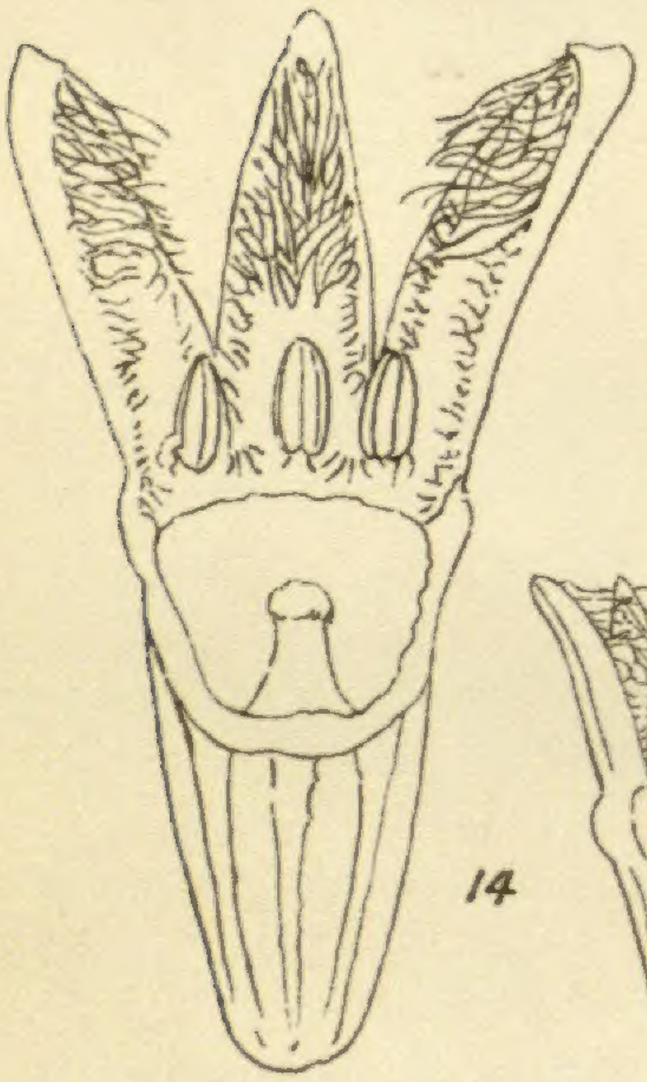
10



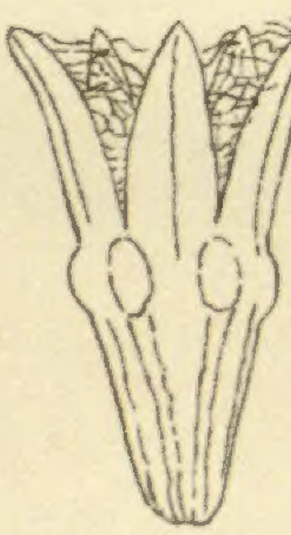
11

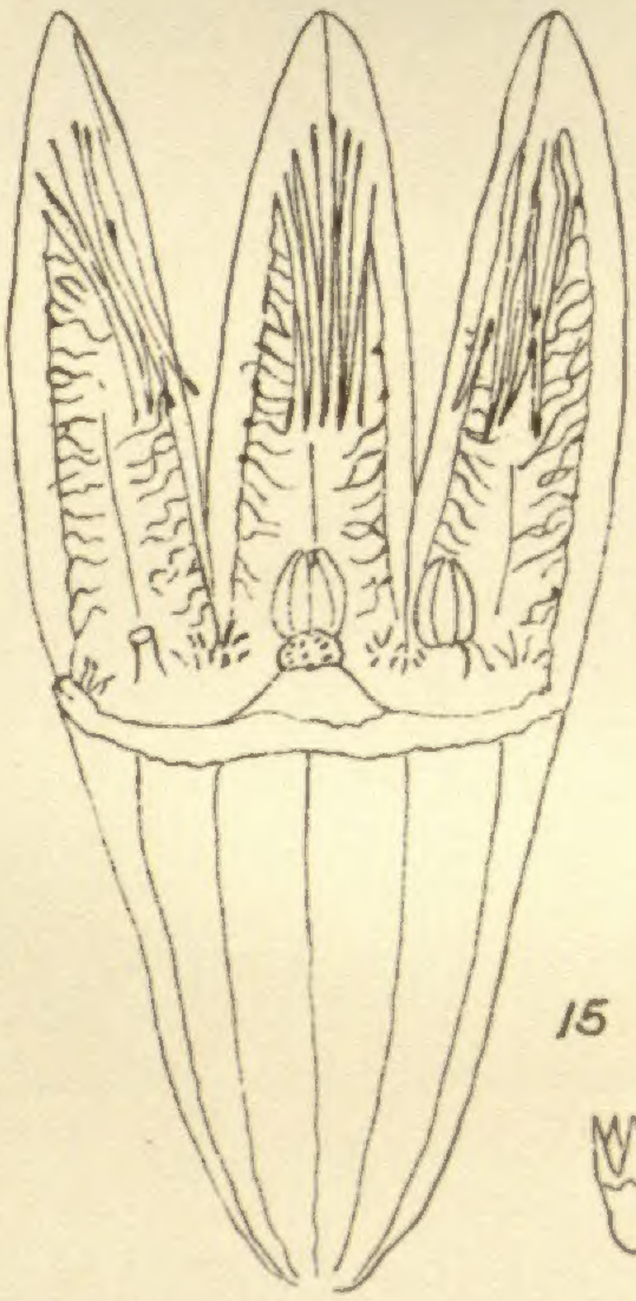
12

13



14





15

16

M. S. del.

Floral Types in Thesium.

3521. 225. 595. 1150. 2. 15.

Malby & Sons, Lith.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 1] [1915

I.—THE GENUS THESIUM IN SOUTH AFRICA, WITH A KEY AND DESCRIPTIONS OF NEW SPECIES.

The genus *Thesium* appears to reach its highest development in South Africa, and is represented there by some 128 species, many of which show considerable external similarity. Owing to the unfortunate circumstance that Alphonse De Candolle and W. Sonder were working independently on the South African species of the genus and that they both published papers with descriptions of a large number of new species in the year 1857, which appeared within a few weeks of each other, considerable confusion has resulted. Sonder, in a supplementary paper,* and De Candolle, in the Prodromus, attempted to harmonise the two monographs and to make the necessary reductions of species, but as the actual types were not always available to these two botanists, a certain amount of uncertainty has continued to exist. An examination of the type specimens collected by Ecklon and Zeyher, preserved at Stockholm, of the Thunberg specimens from Upsala and of type specimens from the Boissier Herbarium and from the herbaria of the British Museum, Berlin and Vienna, in comparison with the specimens at Kew, has permitted the elucidation of most of the outstanding difficulties.

In addition to the types the whole of the more modern collections in the herbaria at Berlin, Zurich, the Boissier Herbarium, the Bolus Herbarium and those of Mr. Galpin and Dr. Marloth have also been studied and have enabled a fairly comprehensive review of the genus to be undertaken for the *Flora Capensis*.†

Several small problems however remain unsolved, most of which demand a careful study of the plants in the field. Some of these are connected with the parasitism of the genus and suggest questions as to the possible effect of the host plant and other

* Flora 1857, No. 26, pp. 401-407.

† To Mr. J. Hutchinson, Assistant for Africa, I am indebted for valuable assistance in the examination of material and the preparation of descriptions of the species.—A.W.H.

(3628) Wt. 225-595. 1,125. 2/15. J.T. & S. G 14.

conditions on the appearance and general habit of the parasite. Then certain biological features require examination, such as the possible heterostyly of some species, as for instance, *T. carinatum* and *T. capitatum*, where such a possibility is outlined. Then again, the question of purity of the species and the possibility of extensive hybridisation is suggested by a study of the genus with its groups of closely related species and by some of the widely varying species in which the extreme types are connected by a complete series of intermediate forms. Finally, the morphology of the flower would repay a careful study in the field with a view to the elucidation of the meaning of the attachment of the anthers to the perianth segments in the majority of the species*; the ring of throat hairs in the section *Annulata* where the anthers are free; the value of the apical beard and the importance and true character of the external glands, which in some species are so conspicuous a feature of the perianth.

De Candolle† grouped the species of South African Thesiums under the following five sections:—

i. **Euthesium** (Perigonium infundibuliforme vel campanulatum lobis non barbatis).
   §1. Stylus elongatus, stigma capitatum.—Species herbaceae perennes.
   T. juncifolium, T. Krebsii, T. angulosum.
   §2. Stylus abbreviatus, truncatus.—Sp. suffrutescentes.
   T. pallidum, T. pinifolium, T. erectiramosum, T. parvifolium, T. brevifolium, T. selagineum, T. ericaefolium, T. acutissimum, T. multiflorum.

ii. **Ætheothesium** (Pars libera perigonii sub-5-partita.—Fruticulus habitu Penaeaceae).
   T. euphorbioides.

iii. **Hagnothesium** (Flores dioici, etc., etc.).
   = *Thesidium.*

iv. **Discothesium** (Perigonium Euthesii, Discus concavus, margine liber.—Rami saepe scandentes).
   T. galioides, T. planifolium.

v. **Frisea,** *Brown* (Lobi perigonii intus ab apice et marginibus barba pendente insignes).
   §1. Pili loborum pone antheras nulli.—Flores spicati.
   T. amblystachyum, T. micropogon, T. flexuosum, T. macrostachyum.
   §2. Pili in medio loborum.—Flores spicati vel capitati.
   T. gnidiaceum, T. carinatum, T. pubescens, T. capitellatum, T. densiflorum, T. euphrasioides, T. micromeria, T. Zeyheri, T. lobelioides.

---

* Ewart in his paper "On the staminal hairs of Thesium" in Ann. Bot. vi. (1892) pp. 271–290 gives a careful description of the structure of the two types of perianth hairs, but their exact function is still obscure. De Candolle had previously given some account of the perianth hairs in his "Note sur la famille des Santalacées" in Soc. Phys. et Hist. Nat. Genève, August, 1857, pp. 11, 12.

† "Espèces Nouvelles du Genre Thesium" présentées a la Société de Physique et d'Histoire Naturelle de Genève dans sa séance du 28 Mai, 1857, par. M. Alph. de Candolle.

Sonder* enumerates 56 species, many of which are of his own creation, and the majority stand to-day. These he grouped chiefly according to vegetative characters without reference to the perianth, and the first 41 species are set out without reference to the presence or absence of the perianth beard. They are grouped under headings such as '*spinosa*,' '*axillaria*,' '*racemosa*,' '*spicata*,' and so on. Under his twelfth heading (m) '*paniculata micrantha*,' however, he brings in the qualifying character '*a* perigonio nudo,' and places under it *T. paniculatum* (= *T. virgatum*, Lam.), *T. nigromontanum*, Sond., *T. squarrosum*, L., *T. corymbuligerum*, Sond., *T. ramellosum*, Sond., *T. leptocaule*, Sond., *T. commutatum*, Sond., and 'β perigonio barbato,' with *T. capituliflorum*, Sond., *T. hispidulum*, Lam., *T. confine*, Sond., *T. hottentottum*, Sond., *T. tenue*, Bernh. (=*T. paniculatum*, L.), *T. debile*, Spreng., and *T. rariflorum*, Sond.

In the Prodromus† De Candolle retains his sections as set out in the earlier paper, though he modifies considerably his arrangement of the section *Frisea*, which is broken up into two subsections depending on the presence or absence of a ring of hairs in the throat of the perianth coupled with the presence or absence of a tuft of hairs attaching the anthers to the perianth-segments. In the second section, including the species without the hairs behind the anthers and with the throat ring of hairs, he places 15 species, seven of which, however, do not rightly belong, since they have no throat ring and the anthers are attached. These seven are *T. junceum*, Bernh., *T. flexuosum*, A.DC., *T. phyllostachyum*, Sond., *T. Ecklonianum*, Sond., *T. griseum*, Sond., *T. magalismontanum*, Sond., and *T. rariflorum*, Sond., which belong properly to his first subsection of the section *Frisea*.

Since the publication of the Prodromus there has been no systematic attempt to revise the Thesiums of the Cape region, although a certain number of new species have been described from time to time. A great deal of material has accumulated, largely owing to the activities of Galpin and Schlechter, which has necessitated the description of 52 new species. Several species described by Sonder, which were reduced by De Candolle, have also been restored.

As was observed by De Candolle, a number of well-marked floral types are to be found in the genus. In the majority of species the characteristic features of the attached anthers obtains. In these cases there is a tuft of hairs behind the anther arising from the face of the perianth-segments or from the tube and more or less adhering to form a rod-like structure which is attached to the apex of the anther and serves to keep that organ in place against the perianth-segments or wall of the tube. The two newly-constituted sections *Imberbia* and *Barbata* include all the species with attached anthers and correspond in part with De Candolle's sections i, ii, iii, and v §1 and 2. A third section corresponding in part to De Candolle's subsection i of his section *Frisea* (to which the name *Annulata* is assigned) is

* Enumeratio Santalacearum in Africa australi extratropica crescentium quas Dr. Ecklon et C. Zeyher collegerunt, W. Sonder in Flora No. 23, 21 June, 1857, pp. 353–364.

† Prodromus xiv. p. 661.

characterised by the absence of the attaching anther hairs and the presence of a ring of downwardly-directed throat hairs arising from the perianth at the level of the attachment of the anther filaments (*see* figs. 14, 15, 16). These perianth hairs, forming a ring, are the equivalent of the attachment hairs seen in other species.* A fourth section may be recognised in which there is a group or pencil of hairs behind each anther which is free and not attached to the anther in any way. This condition has only been noticed in one species, *T. penicillatum* (*see* fig. 13), which forms the type of the newly-constituted section *Penicillata*.

Another means of sub-dividing the species into sections is offered by the character of the perianth-segments, and a natural sub-division can be made of those species which have a conspicuous apical beard from those in which the beard is not present. The former or bearded group, *Barbata*, corresponds in part to De Candolle's section *Frisea*.

The latter group, which has been named *Imberbia*, shows three or four differing types of flower which are probably not of first-rate importance as distinguishing characters for purposes of classification:—(1) The perianth-segments may be simply hooded with the margins perfectly glabrous, as in *T. triflorum* or *T. nigromontanum* (figs. 2 and 3); (2) the perianth-segments may be fringed with minute papillae (*T. strictum*, fig. 6); (3) the perianth-segments may have a marginal fringe of long papillae forming a kind of serrulate edge (*T. Hystrix*, fig. 7); or (4) the margins may be extended to form two lateral flaps or lacinulae as is seen in *T. lacinulatum* (fig. 5). The three first-mentioned floral types are included in the subsection *Subglabra* and the last in the subsection *Fimbriata* of the section *Imberbia*. Between the plants with glabrous perianth-segments and those with papillose margins there appears to be no well-marked dividing line. In *T. strictum* the papillae can be clearly seen, but in a few species though present are scarcely noticeable. The longer serrulate fringe of *T. Hystrix*, *T. hystricoides* and *T. horridum*, and the lacinulae of *T. lacinculatum* and *T. pleuroloma*, however, are definite characters and serve to place these five species in the separate subsection *Fimbriata*.

The disc is another floral feature which is not always clearly marked. It is well seen in *T. triflorum* (fig. 2, and in *T. strictum*, fig. 6) and in allied species with glabrous *Euonymus*-like flowers. A disc or disc-like body also appears to occur in some of the bearded species where there is often an orange, somewhat fleshy base to the perianth.

De Candolle† established a section *Discothesium* on this character and the disc is well marked in *T. triflorum*, *T. scandens*, *T. galioides* and *T. corniculatum* (= *T. acutissimum*), which he placed in the section. Other species, such as *T. lineatum*, *T. strictum*, etc., where the disc is conspicuous, might equally well have been included, and the character does not appear to be sufficiently well-marked to warrant the formation of a section on this character alone.

---

* *See* Ewart in Ann. Bot. vi. 1892, pp. 271-290.

†. De Candolle, Esp. Nouv. Thesium, p. 5.

The external glands afford another feature of doubtful significance. They are present and plainly visible either as small circular or oblong bodies alternating with the perianth-segments in many species (*e.g.*, *T. nigromontanum*, *T. lacinulatum*, *T. coriaceum*, etc.—*see* figs. 3, 5, 8, 9), but in others again they cannot be recognised, and it is often a matter of doubt whether they are entirely absent or only very slightly developed. They may be found in species belonging both to the bearded and unbearded sections of the genus. A detailed investigation* of their morphology is not possible in dried material; it is therefore to be hoped that a botanist in South Africa may be stimulated to make an examination into the morphology and physiology of these obscure organs as well as of other points connected with the biology of the flowers of *Thesium*.

In the bearded section, *Barbata*, after the primary subdivision on the question of the presence or absence of hairs behind the anthers, the chief point of distinction in the flowers lies in the character of the apical beard and the texture of the perianth-segments. More commonly the beard consists of a dense mass of woolly, waved hairs, but sometimes the beard is composed of relatively few, stiff, straight, comb-like hairs. In some of the species with this type of beard the perianth-segments are horny and translucent and the margins of the segments are fringed with a frill of short fine hairs, as for instance in *T. spicatum* (fig. 15).

The stiff and the woolly types of beard have been found to afford a good character for separating certain species such as *T. junceum*, *T. flexuosum*, *T. natalense*, etc., which exhibit considerable external resemblance.

The position of the anthers, either included in the tube or exserted and carried up against the perianth-segments is an important character in the section *Barbata* and is often found to be associated with the length of the style. When the stigma is sessile the anthers are often inserted deep down in the tube, as in *T. carinatum* (fig. 10).

The possibility that heterostylism may occur in the genus is suggested by the floral arrangements of the two closely similar species, *T. carinatum* and *T. capitatum* (*cf.* figs. 10 and 11), but the relative lengths of anthers and style in the two species, though highly suggestive of this state, are not quite convincing. So similar in general appearance are these two species, however, that it is frequently impossible to assign a specimen to the proper species without dissecting the flower.

Throughout the genus it is unusual for the style to be of such a length that the surface of the stigma is above the level of the anthers. Sometimes it is at about the level of the middle of the

* The gland-like structures have been examined, as far as is possible with herbarium material, by Mr. L. A. Boodle. These portions of the perianth are rather thicker than the adjoining parts, and may have dense or brown contents in their internal tissues. They are all the more striking in comparison with the large, nearly empty cells lying adjacent which are connected with the staminal hairs. The epidermis bounding the structures externally has a considerably thinner wall than the epidermis of the intervening parts, and this feature may indicate that an excretion is exuded from them on the outer side of the perianth tube.

anthers, but more commonly the style is short and stout and does not attain to the anther level; very often the stigma may be sessile.

The vegetative organs display a wide range of variation, and the genus includes herbs, subshrubs and shrubs, erect, prostrate or scandent, which may be densely leafy or almost leafless, more or less succulent or sharply spinous.

The leaves, when well developed, are usually linear, linear-lanceolate or acicular, more or less keeled, and are generally larger towards the base of the plant; the floral bracts are similar to the leaves. *T. euphorbioides*, with its large amplexicaul leaves, is quite a unique species. In many species the leaves are merely subulate scales and both they and the bracts may have fimbriated or scurfy edges or blackish, acuminate tips.

In the spinous species the leaves may be closely folded with sharp edges and form spines (*T. spinosum*, *T. spinulosum*), or they may be solid terete spines as in *T. pungens*. The branches also end in spinous tips.

The stems are usually grooved, the ridges in many species, as for instance in *T. lineatum*, being pronounced, and in *T. angulosum* they are extended to form definite wings. The species with spinous stems (*T. rigidum*, *T. Hystrix*, etc.) are peculiar in having an irregular wrinkled surface, and the cortical tissue in these species as in the others with few leaves is of chief importance in assimilation.

Pubescence is not common, but it may be found both among the spinous and leafy species.

In some species there is a good deal of variation, and it is not always easy to assign a specimen very definitely to a particular species. This occurs especially with specimens of *T. virgatum*, *T. strictum* and allied species, also in *T. funale* and its allies. In such cases, where species occupy the same geographical areas, it seems probable that hybridisation may account for the observed resemblances.

Owing to the general precision of the work of Sonder and De Candolle it has not been found necessary to reduce many of their species, but in one instance considerable confusion has arisen. The type of Linnaeus' species *T. paniculatum*, preserved in the Linnean Herbarium, and described in the Mantissa, p. 54, does not appear to have been seen by any other writers on the genus. Sonder quotes a specimen preserved at Stockholm as Linnaeus' type, but this is an entirely different plant agreeing with *T. virgatum*, Lamarck. Thunberg has two sheets labelled *T. strictum* δ and γ in his herbarium which bear specimens (δ spec. dextr.* γ spec. sinistr.) also referable to *T. virgatum* and the large number of specimens collected since, some of which have been referred to *T. Dregeanum*, A.DC., and *T. erecti-ramosum*, A.DC., all belong to *T. virgatum*, Lam., which is the *T. paniculatum* of Sonder. De Candolle has labelled some of the specimens, which he afterwards placed under *T. paniculatum*, Sond., with the name *T. cucullatum* (DC. Prodr. xiv. 656), but

* The left-hand specimen on the sheet of *T. strictum* δ in Herb. Thunberg is *T. euphrasioides*, A.DC.

it has seemed better to take up Lamarck's earlier name, to which a short description is attached.

The true *T. paniculatum* of Linnaeus proves to be identical with *T. tenue*, Bernhardi (Flora, 1845, p. 81), a plant belonging to the section *Barbata* and quite distinct from *T. virgatum*.

T. debile, Spreng., from the specimen preserved at Stockholm also appears to be a weak straggling form of *T. paniculatum*, Linn.

The confusion over the name *T. paniculatum* is further increased by the fact that there is a specimen with this name in the Thunberg Herbarium (*see* Thunb. Fl. Cap. ed. Schult. p. 210), different from any of the specimens to which reference has been made. This plant was made the type of *T. Thunbergianum* by De Candolle (Prodr. xiv. p. 666), but as Sonder very rightly points out, *T. selaginoides*, A.DC. (Esp. Nouv. Thes. 3; Prodr. xiv. 658) is the same thing as Thunberg's plant and has been wrongly placed by De Candolle among the unbearded species. *T. paniculatum*, Thunb., and *T. Thunbergianum*, A.DC., have therefore been reduced to *T. selaginoides*, A.DC., as it has not been possible to retain Thunberg's name.

One other point deserving of notice is that certain species appear to be vanishing or may already have been lost; *T. rigidum*, *T. diversifolium*, *T. macrostachyum* and *T. micropogon*, for instance. were all collected by Ecklon and Zeyher, but do not appear to have been found since by any other collectors. It may be that they have been entirely destroyed by bush fires. Burchell's plants in many cases are also represented by his specimens alone, but this is probably to be accounted for by the fact that many of his collecting grounds have not been revisited.

In drawing up a key to the species a good deal of use has been made of the different types of inflorescence, since on this character affinities appear to be more clearly marked for the smaller groups of species than with any other. At times, especially with the looser types of flower arrangement, it is not easy to draw a hard-and-fast distinction between loose cymose racemes and panicles, but for the general broad types the distinctions seem fairly sound. In the case of the plants with solitary or subsolitary flowers and leafy stems belonging to the bearded section (*T. rariflorum*, *T. Zeyheri*, *T. cytisoides*, *T. Burchellii*), no doubt a very artificial group has resulted, since the plants collected together probably have their allies among species with unreduced flower heads, whilst the other group with solitary flowers, including *T. sertulariastrum*, *T. paniculatum*, L. (T. tenue *Bernh.*), *T. euphrasioides*, *T. micromeria*, *T. capituliflorum* and *T. cuspidatum* appear to form a group of closely allied species.

The treatment of some of the spinous plants is also no doubt somewhat artificial, but for the sake of simplicity in drawing up the key it seems better to retain a few inconsistencies in arrangement.

In revising the genus for the *Flora Capensis* it has been found necessary not only to redraft the generic description, but also in order to prevent confusion to redefine the sections and give them fresh names.

The exact definitions of the sections follow the generic description. The section *Imberbia*, with its subsections *Subglabra* and *Fimbriata*, corresponds in the main with De Candolle's *Euthesium* and includes also his sections *Aetheothesium* and *Discothesium*. The sections *Barbata* and *Annulata* correspond with the section *Frisea*, with its two subsections and the section *Penicillata* has been formed to accommodate a type of flower not previously recognised.

De Candolle at the end of his enumeration gives certain '*species dubiae*.' These, as far as they relate to Cape plants, have been satisfactorily placed, as the types in the Stockholm Herbarium have been examined.

Of the '*species nomine tantum cognitae*' (Prodr. xiv., p. 672), the five Cape plants were collected by R. Brown and the specimens have been examined at the British Museum. It has been found that—

T. ciliatum, R. Br. = *T. scabrum*, Linn.
T. crassifolium, R. Br. = *T. Frisea* β *Thunbergii*, A.DC.
T. ericoides, R. Br. = *T. ericaefolium*, A.DC.
T. sparteum, R. Br. = *T. lineatum*, Linn.
T. teretifolium, R. Br. = *T. spinosum*, Linn.

Explanation of plates illustrating the different types of floral morphology in the South African Thesiums.

A natural size drawing of the flower is shown with each figure. The name and number placed in brackets refer to the specimen from which the drawing was made. All the drawings were executed by Miss M. Smith.

Fig. 1.—*T. hirsutum*, A. W. Hill (*Galpin* 1585). Longitudinal section of flower, glabrous perianth-segments, cup-like disc and elongated style. The external view shows the long perianth-tube. The anthers are attached by a tuft of hairs.

Fig. 2.—*T. triflorum*, Thunb. (*Bowker*). External view showing glands and hooded perianth-segments. In the section note the saucer-shaped, lobed disc and attached anthers.

Fig. 3.—*T. nigromontanum*, Sond. (*Ecklon & Zeyher* 17). Compare with fig. 2. Note the deep hood of the glabrous segments and short conical style. The disc is not noticeable.

Fig. 4.—*T. virens*, E. Mey (*Gerrard*). The perianth-segments are glabrous and the tube elongated. The style is very long and overtops the stamens, which are inserted on the perianth-segments. External glands not seen.

Fig. 5.—*T. lacinulatum*, A. W. Hill (*Pearson* 7805). The perianth externally is minutely hirsute. Note the conspicuous external glands, the hooded perianth-segments and the two lateral flaps or laciniae on the margins. The anther attachment-hairs are united to form a single strand.

Fig. 6.—*T. strictum*, Berg. (*MacOwan* 765). The stout perianth-segments are fringed with minute papillae. A disc is present and the anthers are attached by a tuft of hairs.

Fig. 7.—*T. Hystrix*. A. W. Hill (*Galpin* 5503). The perianth-segments are fringed with long tooth-like papillae. There is a tuft of hairs behind the anthers and a short conical style not reaching to the anther level.

Fig. 8.—*T. coriarium*, A. W. Hill (*Sankey* 223). This species belongs to the section *Barbata*. The beard is dense and extends down the margins. The anthers are inserted in the tube and attached by a group of hairs. The style does not reach to the base of the anthers. The oblong glands are very large and conspicuous.

Fig. 9.—*T. asterias*, A. W. Hill (*Galpin* 1585). Note the very long perianth-segments and short tube. The segments, which are bearded only at the apex, have the incurved margins fringed with short hairs. The anthers are inserted in the tube and the stigma is sessile.

Fig. 10.—*T. curinatum*, A. DC. (*Schlechter* 8719). Note the long perianth-tube with anthers inserted at the base and the subsessile stigma.

Fig. 11.—*T. capitatum*, Linn. (*Ecklon & Zeyher* 1). The perianth-segments are stout and densely bearded. Anthers inserted about the middle of the tube with a large tuft of short attachment hairs behind. The style is elongated and reaches to the middle of the anthers. *cf.* fig. 10.

Fig. 12.—*T. acuminatum*, A. W. Hill (*Wolley Dod* 2806). A species with spreading perianth-segments in the open flowers. Note the long fleshy hood to the segments with constricted throat and anthers inserted in the tube. External glands not seen.

Fig. 13.—*T. penicillatum*, A. W. Hill (*Galpin* 4546). The perianth-segments have a conspicuous apical beard and hairy margins. The anthers are inserted in the tube and have a brush or pencil of hairs behind them, but the hairs are quite free from the anthers. Stigma subsessile. Type of the section *Penicillata*.

Fig. 14.—*T. patulum*, A. W. Hill (*Bolus* 9981). The stout perianth-segments have a fairly stiff apical beard and fringed margins. The anthers are inserted at the throat of the tube and there are no attachment hairs, but there is a ring of golden-brown hairs at the level of the anther insertion. The base to the perianth is disc-like and more or less glandular. This and the two following figures show the characters of the section *Annulata*.

Fig. 15.—*T. spicatum*, Linn. (*Bolus* 4206 B). The perianth-segments are long, stout and horny, and the apical beard is comb-like with long, stiff, stout hairs; the margins are fringed with woolly hairs. The anthers and the ring of hairs are inserted at the throat. Stigma subsessile.

Fig. 16.—*T. arceolatum*, A. W. Hill (*Schlechter* 11,138). The anthers and ring of hairs are inserted in the perianth-tube. No hairs behind the anthers. Stigma subsessile.

Description of genus with key and description of new species.

Thesium, *Linn.*, Benth. et Hook. f. Gen. Pl. iii. 221.

Flores hermaphroditi. *Perianthium* superum, in receptaculo tubulare vel turbinato ovarium involvens cupulariforme; segmenta 5, valvata, plus minusve cucullata, intra apicem barbata vel nuda, marginibus pubescentibus papillosis lacinulatis vel glabris interdum incurvis, pilorum fasciculo plerumque post antheras orto et earum apicibus adhaerente instructa vel fasciculis absentibus pilorum annulo ad filamentorum insertiones fauces perianthii cingente. *Stamina* 5, ad segmentorum bases vel in perianthii tubo inserta; filamenta brevia, gracilia; antherae ovoideae vel oblongae, loculis geminatis parallelis longitudinaliter dehiscentibus. *Discus* epigynus saepe conspicuus. *Ovarium* inferum, 3-merum, ovulis 2–4 ab placenti flexuosi gracilis apice pendulis; stylus cylindricus vel submullus, stigmate capitato vel obscure 3-lobato coronatus. *Fructus* siccus, globosus, ellipsoideus vel obovoideus, plerumque 10-costatus, inter costas plus minusve conspicue reticulatus, perianthio persistente coronatus. *Semina* ambitu fructibus similia; embryo in centro albuminis carnosi saepe obliquus, radicula cotyledonibus aequilonga vel longiore.

Herbae vel suffrutices, plerumque [vel semper?], semiparasitici, glabri vel pubescentes; folia in speciebus austro-africanis linearilanceolata, linearia, subulata vel multo reducta et squamiformia vel spinosa, rarius suborbicularia; *inflorescentia* racemosa, spicata, paniculata, vel frequenter cymosa, laxa vel compacta, interdum floribus in capitula parva vel mediocria aggregatis: flores in axillis bractearum solitariarum dispositi bracteolis binis vel paucis additis.

Distrib. Species about 250, two only South American, the others inhabiting the temperate regions or the mountains of the tropical zone of the old world, about 70 extra-African.

Sectio I.—Imberbia (sect. nov.). Perianthii segmentorum margines integri, papillosi, fimbriati vel lacinulis instructi, apice ebarbati; antherae apice ad perianthii segmenta vel tubum pilis fasciculis affixae.

Subsectio 1.—**Subglabra.** Perianthii segmentorum margines glabri vel papillosi.

Subsectio 2.—**Fimbriata.** Perianthii segmentorum margines fimbriati vel lacinulis instructi.

Sectio II.—Barbata (sect. nov.). Perianthii segmenta apice pilis dependentibus plus minusve dense barbata, marginibus plus minusve pubescentibus; antherae apice ad perianthii segmenta vel tubum pilis fasciculis affixae.

Sectio III.—Penicillata (sect. nov.). Perianthii segmenta apice dense barbata; pilorum fasciculi post antheras liberi et ad easdem non adhaerentes.

Sectio IV.—Annulata (sect. nov.). Perianthii segmenta apice plus minusve dense barbata, rarius papillosa; pilorum fasciculi post antheras nulli sed pilorum aureorum annulus in perianthii fauce ad filamentorum insertiones.

Section I.—Imberbia.

Subsection i.—**Subglabra.**

Perianth-segments glabrous or fringed with minute papillae, anthers attached to segments by a tuft of hairs:—

1. Flowers usually single in the bract axils and arranged in simple terminal spikes or racemes:—

Plants with rigid spine-like branches, leaves spinous, spinulose, scale-like or, if leafy, fugacious:—

Leaves spinous or spinulose:—

Leaves stout, all spinous:—

Leaves folded, decurrent ... *T. spinosum.*

Leaves solid, terete, not decurrent ... ... *T. pungens.*

Upper leaves spinulose, lower linear ... ... *T. spinulosum.*

Leaves not spinous:—

Branchlets spinous, stems sulcate, leaves linear, fugacious ... *T. lineatum.*

Branchlets spinous, leaves scale-like ... ... *T. rigidum.*

Plants not spinous, herbs or sub-shrubs, leaves herbaceous or fleshy:—

Flowers with well-marked perianth-tube:—

Plants hairy ... ... *T. hirsutum.*

Plants glabrous:—

Plants with weak straggling branches ... ... *T. virens.*

Plants with erect stiff branches:—

Flowers pedunculate, bracts slightly adnate to peduncle, leaves hard, acutely acuminate ... ... *T. costatum.*

Flowers sessile, or if shortly pedunculate bracts wholly adnate, leaves herbaceous:—

Stems tall, leaves 1·2–3 cm. long ... ... *T. Nationae.*

Stems short, leaves 3–5, 1 cm. long ... ... *T. racemosum.*

Flowers without marked perianth-tube and more or less provided with a disc:—

Leaves succulent ... ... *T. crassifolium.*

Leaves herbaceous:—

Plants minutely scabrid ... *T. disciflorum.*

Plants glabrous:—

Flowers pedicellate in axils of leafy bracts, bracteoles very small, inflorescence indefinite, bracts not adnate to pedicels ... ... *T. namaquense.*

Flowers in more or less definite terminal inflorescences, bracts more or less adnate to pedicels, bracteoles about equal in length to bracts :—
Perianth-segments glabrous, much branched herbs or subshrubs :—
Slender subprostrate herbs, leaves narrowly linear, acuminate, ascending *T. acutissimum.*
Stout subshrubs, leaves broadly linear, subacute, recurved ... *T. squarrosum.*
Perianth - segments with papillose margins, stout erect shrubs :—
Plants densely leafy, bracts and bracteoles longer than flower... *T. foliosum.*
Plants with few scattered leaves, bracts and bracteoles shorter than flowers ... *T. fruticosum.*
2. Flowers in axillary cymules arranged in many-flowered cymose heads, elongated spikes or more or less dense racemes or panicles of cymules :—
Plant spinous ... ... *T. dissitiflorum.*
Plant not spinous :—
a. Flowers aggregated in compact terminal many-flowered racemose heads :—
Leaves and bracts broadly ovate-lanceolate, leaves amplexicaul *T. euphorbioides.*
Leaves acicular, terete ... ... *T. pinifolium.*
β. Flowers in axillary cymules forming elongated determinate spikes or racemes, plants erect :—
Cymules sessile in bract axils, bracts much longer than cymules ... ... *T. glomeruliflorum.*
Cymules shortly pedunculate, compact, bracts shorter than cymules :—
Stems winged ... ... *T. angulosum.*
Stems not winged ... ... *T. Susannae.*
7. Flowers in indeterminate branched racemes, cymules 3–5-flrd, peduncles elongated, divaricately branched, plants scandent :—
Leaves and bracts 1·2–4 cm. long :—
Leaves and bracts broadly linear or linear lanceolate ... *T. triflorum.*

Leaves fleshy, terete ... ... *T. scandens.*
Leaves and bracts less than 6 mm. long ... ... *T. galioides.*

δ. Flowers in loose paniculate inflorescences:—
Plants scabrid ... ... *T. asperifolium.*
Plants glabrous:—
Leaves reduced, about 2 mm. long ... ... *T. corymbuligerum.*
Leaves well developed 0·8-4 cm. long:—
All leaves about 8 mm. long, numerous and recurved, bracts only slightly adnate to peduncles ... *T. squarrosum.*
Lower leaves 1·2-4 cm. long, all leaves ascending, bracts adnate for some distance to peduncles:—
Stems sharply ribbed, leaves and bracts keeled, cymules lax ... ... *T. floribundum.*
Stems slightly ribbed, leaves and bracts more or less rounded on back, cymules compact ... *T. pallidum.*

3. Flowers arranged in small terminal cymose heads or clusters:—
Branches fairly densely leafy; leaves well-developed, fruits not or scarcely reticulate between ribs, bracts glabrous:—
Branches erect, perianth without external glands ... ... *T. quinqueflorum.*
Branches spreading, perianth with conspicuous external glands:—
Leaves imbricate, bracts and bracteoles longer than flowers, inflorescences inconspicuous .. *T. cupressoides.*
Leaves lax, bracts and bracteoles equal to or shorter than flowers, inflorescences conspicuous ... ... *T. ericaefolium.*
Branches very sparingly leafy or nearly leafless, leaves small and bract-like, bract-margins finely serrulate:—
Stigma subsessile, bracts equal to or longer than flowers:—
External glands conspicuous, bracts acutely acuminate ... *T. nigromontanum.*
External glands not seen, bracts acute:—
Perianth-segments glabrous, lower leaves 2-4 mm. long *T. leptocaule.*

Perianth-segments with papillose margins; lower leaves up to 1·2 cm. long ... *T. commutatum.*

Style 0·6 mm. or more long, bracts about half the length of flowers:—

Leaves few, scale-like, ovate-triangular, 1·8 cm. long ... *T. nudicaule.*

Leaves well-developed, oblong-lanceolate, 6 mm. long, flat, obtuse or subacute ... ... *T. Schaumannianum.*

4. Flowers arranged in compact corymbose or umbellate inflorescences, leaves few, scattered:—

Plants slender, rush-like, leaves subulate, rarely a few narrowly linear basal leaves; perianth 1–1·5 mm. long, margins of segments minutely papillose or subglabrous, corymbs few-flowered:—

Leaves almost absent, branchlets leafless, below corymbs ... *T. juncifolium.*

Leaves subulate, fairly numerous on branchlets below corymbs ... *T. virgatum.*

Plants, stout, woody, leaves somewhat fleshy linear-lanceolate, conspicuous, towards base up to 6·5 cm. long; perianth 1·8–4 cm. long, margins of segments more or less conspicuously papillose, corymbs many-flowered:—

Perianth 3·5–4 mm. long, fringe of papillae conspicuous, anthers 0·8 mm. long, style 1 mm. long *T. occidentale.*

Perianth 1·5–2·5 mm. long, papillae short, anthers 0·3 mm. long, style 0·5 mm. long ... ... *T. strictum.*

Subsection ii.—**Fimbriata.**

Perianth-segments with a marginal fringe of long papillae or with two lateral lacinulae but no apical beard. Anthers with attachment hairs. Plants usually rigid, woody, spinescent:—

Margins of perianth-segments with lacinulae:—

Stems rigid, spinescent, puberulous *T. lacinulatum.*

Stems flexuous, herbaceous, glabrous *T. pleuroloma.*

Margins of perianth-segments fimbriate with fringe of long papillae:—

Branchlets spinescent, ascending, crowded, covered with imbricate adpressed leaves ... ... *T. horridum.*

Branchlets spinescent, spreading, leaves scale-like:—

Plants covered with minute hairs ... *T. hystricoides.*

Plants glabrous ... ... *T. Hystrix.*

Section II.—Barbata.

Perianth-segments with a dense apical beard of stiff or woolly hairs, anthers attached to the segments or tube by a tuft of hairs:—

1. Flowers solitary or in small 3–5-flowered clusters at the ends of main and axillary branches, bracts forming an involucre, leaves reduced to scales, rarely narrowly linear or acicular leaves also present:

Flowers solitary:—
Plants minutely puberulous ... *T. sertulariastrum.*
Plants glabrous:—
Plants slender, profusely branched with scale and numerous long narrowly linear leaves ... *T. paniculatum.*
Plants stout, upper leaves all scale-like, a few stout acicular leaves below ... ... *T. euphrasioides.*
Flowers in small clusters:—
Anthers exserted ... ... *T. micromeria.*
Anthers included in perianth tube:—
Bracts much shorter than flowers, ovate-lanceolate with blackish acuminate tips, leaves adpressed, all subulate-acuminate *T. capitulifforum.*
Bracts nearly as long as flowers, ovate-elliptic with membranous margins, leaves somewhat spreading acicular to triangular-lanceolate ... ... *T. cuspidatum.*

2. Flowers solitary or in groups of 2 or 3 at ends of branches, bracts not forming involucre, all leaves well developed:—

Anthers included in perianth tube ... *T. rariflorum.*
Anthers exserted:—
Flowers over 4 mm. long, style exceeding 2 mm. long ... ... *T. Zeyheri.*
Flowers not exceeding 2·5 mm. long, style 0·5–1 mm. long:—
Branches erect, fastigate, leaves scattered, bracts as long as flowers ... ... *T. cytisoides.*
Branches spreading, densely leafy, bracts longer than flowers ... *T. Burchellii.*

3. Flowers in small terminal or subterminal heads or clusters; plants more or less prostrate, much branched:—

Leaves few and more or less scale-like, especially at ends of branches:—
Lower leaves not scale-like, anthers included in perianth tube ... *T. repandum.*

Leaves nearly all reduced to scales, anthers exserted ... ... *T. glaucescens.*
Leaves numerous, acicular or linear-lanceolate, equally distributed over the stem:—
Stems and leaves scabrid-puberulous *T. hispidulum.*
Stems and leaves glabrous:—
Leaves acicular, acute, ascending:—
Plants lax, spreading, anthers exserted ... ... *T. prostratum.*
Plants stout, much branched, anthers included in tube ... *T. acuminatum.*
Leaves linear-lanceolate, flattened above, recurved, scattered or densely imbricate:—
Plants slender, spreading, much branched, anthers exserted *T. seligineum.*
Plants stout, branches few, ascending, anthers included:—
Leaves scattered, stigma subsessile ... ... *T. capitellatum.*
Leaves densely imbricate, style 1·5 mm. long ... *T. imbricatum.*

4. Flowers arranged in simple terminal spikes, racemes or in cymose or loose paniculate racemes:—
a. Flowers in simple spikes or racemes, bracts not adnate to peduncles:—
Stems rush-like, leaves scale-like or rarely linear-subulate, bracts with hyaline, scurfy or finely fringed margins:—
Flowers in lax spikes, bracts with scurfy or hyaline margins:—
Apical beard of dense woolly hairs, anthers included in perianth-tube:—
Bracts and leaves ovate, scales with broad scurfy margins *T. junceum.*
Bracts with membranous margins sometimes with slight scurfy edge:—
Bracts subulate, acutely acuminate, leaves linear-subulate ... *T. natalense.*
Bracts broadly ovate, acute, leaves ovate scales ... ... *T. scirpioides.*

Apical beard of stiff comb-like hairs. anthers partly exserted :—
Slender annuals, 10–12 cm. high, inflorescences lax.. *T. paronychioides.*
Straggling much branched undershrub, 30 cm. high, inflorescences compact, often branched ... ... *T. flexuosum.*
Flowers in short more or less dense spikes, bracts with finely fringed margins :—
Stems slender, ascending, brown when dry ... ... *T. spartioides.*
Stems stout flexuose or prostrate, grey when dry ... *T. confine.*
Stems leafy, leaves well developed, bracts with entire or rarely scabrid margins, never scurfy :—
Flowers in compact dense spikes, style 0·5 mm. long, bracts equal to or longer than the flowers :—
Plants finely pubescent :—
Leaves rounded on back, perianth externally glabrous ... ... *T. griseum.*
Leaves ribbed, perianth externally hairy ... ... *T. transvaalense.*
Plants glabrous :—
Bracts finely scabrid-puberulous on margins ... *T. gnidiaceum.*
Bracts glabrous on margins :—
Stigma sessile or subsessile, anthers in perianth tube *T. phyllostachyum.*
Style 0·5 mm. long, anthers exserted ... ... *T. impeditum.*

B. Flowers in elongated lax spikes, style 0·8 mm. or more long, bracts shorter than flowers ... ... *T. magalismontanum.*

γ. Flowers in racemes. bracts adnate to peduncles :—
Bracts equal to or longer than flowers :—
Styles 1 mm. long or more. leaves scattered :—
Bracts with minutely serrulate or scabrid margins :—
External glands conspicuous :—
Perianth 2–2·5 mm. long (flowers often in cymules) ... ... *T. Burkei.*

Perianth 4 mm. or more long ... ... *T. orientale.*
External glands not present:—
Bracts equal in length to flowers, rounded on back, minutely serrulate ... ... *T. macrogyne.*
Bracts longer than flowers, keeled, margins membranous scabridulous. *T. lobelioides.*
Bract margins entire, glabrous:—
External glands scarcely visible:—
Bracts keeled, leaves erect.. *T. Goetzeanum.*
Bracts rounded on back, leaves recurved ... *T. resedoides.*
External glands conspicuous:—
Plants slender, leaves narrowly linear, curved... *T. Junodii.*
Plants stout, leaves straight:—
Perianth over 4 mm. long, segments flat without hood, bracts elliptic - lanceolate, obtuse ... ... *T. coriarium.*
Perianth 3 mm. long, with deep hood, bracts lanceolate, acute ... ... *T. nigrum.*
Styles very short, stigma subsessile, plants densely leafy ... *T. gracillarioides.*
Bracts much shorter than the flowers, stigma sessile:—
Plants branching from the base, leafy, perianth 2·8–3·5 mm. long .. .. *T. asterias.*
Plants branching above, sparingly leafy, perianth 1·5 mm. long *T. polygaloides.*
δ. Flowers usually in 3-flowered pedunculate cymules in bract axils arranged in racemes:—
Leaves with recurved tips ... ... *T. resedoides.*
Leaves straight:—
Bracts longer than cymules, adnate for some length to peduncles.. *T. Burkei.*
Bracts shorter than the cymules, slightly adnate to peduncles:—
Racemes elongate, distinct, perianth glands conspicuous, style reaching to top of anthers ... ... *T. cornigerum.*
Racemes short, glands not seen, style below base of anthers *T. palliolatum.*

ϵ. Flowers in loose paniculate racemes :—
Plants lax with spreading leafy branches, leaves linear-lanceolate, bracts longer than flowers *T. gypsophiloides.*
Plants stiff erect, with erect branches, leaves scattered, narrowly linear, bracts shorter than flowers ... *T. utile.*

5. Flowers in compact rounded heads, short compact spikes or dense corymbose heads or clusters, leafy subshrubs :—
α. Flowers in corymbose heads or clusters :—
Bracts conspicuous, stigma sessile :—
Bracts broadly oblanceolate with conspicuous translucent margins, foxy-red ... ... *T. fallax.*
Bracts lanceolate, margins inconspicuous, greenish-yellow ... *T. helichrysoides.*
Bracts inconspicuous, style elongate *T. umbelliferum.*
β. Flowers in rounded heads or compact spikes :—
Leaves and bracts covered with a fine pubescence :—
Leaves adpressed to stem, stigma sessile ... ... *T. Boissieranum.*
Leaves spreading, style elongate :—
Leaves very dense, bracts green, flowers in rounded heads... *T. pubescens.*
Leaves more scattered, bracts ruddy, flowers in compact spikes ... ... *T. rufescens.*
Leaves and bracts with scabrid margins ... ... *T. scabrum.*
Leaves and bracts glabrous :—
Stems woody, flowering branches with leaves remote ... ... *T. polycephalum.*
Stems herbaceous, leaves numerous :—
Leaves imbricate, adpressed, stout, obtuse ... ... *T. microcephalum.*
Leaves somewhat spreading, linear, acute to acuminate *T. pycnanthum.*
Leaves glabrous, bracts with broad hyaline and more or less scarious or rarely finely scabrid-puberulous margins :—
Stems prostrate ... ... *T. Ecklonianum.*
Stems erect :—
Inflorescences dense spikes :—
Leaves recurved, bracts glabrous, style elongate ... *T. Sonderianum.*

Leaves erect, bracts finely scabrid - puberulous on margins, stigma subsessile ... ... *T. gaidiaceum.*

Inflorescences globular or corymbose heads, leaves erect or slightly spreading:—

Style elongate, 1·8-3·4 mm. long:—

Stems densely leafy especially near flower-heads *T. capitatum.*

Stems with more or less scattered leaves, very few below the flower heads ... ... *T. glomeratum.*

Style short, 0·5 mm. long, perianth-tube markedly shorter than the segments ... ... *T. fimbriatum.*

Stigma sessile:—

Perianth-tube very short, segments elongate, with a small beard at apex and papillose margins ... ... *T. translucens.*

Perianth - segments with dense woolly beard, tube well marked:—

Bracts broadly ovate-lanceolate, leaves scattered ... ... *T. densiflorum.*

Bracts lanceolate, leaves crowded, imbricate.. *T. carinatum.*

Section III.—Penicillata.

Perianth segments with dense apical beard, anthers free, but with a pencil of free hairs on the segments behind anthers:—

Only South African species... ... *T. penicillatum.*

Section IV.—Annulata.

Perianth with a ring of hairs at the throat, anthers without attachment hairs, segments with apical beard or rarely with papillose margins:—

1. Flowers in elongated spikes or racemes:—

Perianth-segments with papillose margins ... ... *T. micropogon.*

Perianth-segments bearded:—

Anthers included in perianth-tube.. *T. urceolatum.*

Anthers exserted:—

Plants with numerous stout spreading branches almost at right angles to stem, style 0·5 mm. long ... ... *T. patulum.*

Plants sparingly branched, branches erect, stigma sessile :—
Plants slender, bracts small, subulate, perianth 1·5 mm. long ... ... *T. funale.*
Plants stout, bracts leaf-like, perianth above 2 mm. long *T. macrostachyum.*

2. Flowers in heads or short spicate clusters :—
Flowers in rounded heads or dense compact spikes with imbricate conspicuous bracts, perianth-segments with an apical beard of stiff comb-like hairs :—
Bracts distinctly toothed on margins :—
Upper leaves numerous, lanceolate, recurved at tip ... ... *T. diversifolium.*
Upper leaves few, subulate, ascending ... ... *T. aggregatum.*
Bracts quite entire, usually reddish-brown when dry :—
Spikes stout, oblong or subcapitate, bracts broadly ovate, plants leafy :—
Spikes mostly oblong, bracts broadly ovate, sharply keeled, upper leaves linear-subulate ... ... *T. spicatum.*
Spikes mostly depressed-capitate, bracts lanceolate, not sharply keeled, upper leaves linear ... ... *T. bathyschistum.*
Spikes rather slender, often elongated, bracts linear-lanceolate, plants with few leaves.. *T. submudum.*

3. Flowers in more or less lax heads or spicate clusters, bracts inconspicuous, perianth-segments with dense woolly beard :—
Style above 0·5 mm. long ... ... *T. elatius.*
Stigma sessile :—
Bracts with fringed margins ... *T. Frisea.*
Bracts with entire margins :—
Leaves more or less crowded, adpressed to stem, somewhat fleshy ... ... *T. annulatum.*
Leaves scattered spreading :—
Leaves narrowly linear, flower-heads globose, few-flowered *T. brachyglyne.*
Leaves broadly linear, flowers in ovoid spikes, many-flowered *T. Patersoniae.*

The descriptions of the new species and varieties are placed in alphabetical order.

T. acuminatum, *A. W. Hill*; species distincta, *T. capituliflora*, Sond., similis, perianthii segmentis apice longe aicularibus repandis dense barbatis, foliisque aicularibus differt.

Rhizoma gracile, erectum, subteres, circiter 3·5 mm. crassum; caules e rhizomate numerosi, patuli vel ascendentes, subteretes, glabri. *Folia* aicularia, acuta, 0·8 2·5 cm. longa, subteretia, glabra. *Flores* in glomerulos subdensos terminales dispositi. *Bracteae* triangulari-lanceolatae, acutae, carnosae, 2-3 mm. longae, glabrae; bracteolae floribus circiter dimidio breviores. *Perianthii segmenta* 1·5 mm. longa, lineari-lanceolata, apice longe aicularia, repanda, inferne dense adpresse barbata. *Antherae* ad perianthii tubi basin inclusae, 0·5 mm. longae. *Stylus* 0·25 mm. longus. *Fructus* ovoideo-globosus, circiter 4 mm. longus, tenuiter costatus et reticulatus.

Cape Div.: near Noah's Ark Battery, Simonstown, Sept., *Wolley Dod* 2806! 3016! Simon's Bay, *Wright* 536! hills west of Simonstown, Oct., *Wolley Dod* 1879! Muizenberg, 320 m., Aug., *Bolus* 8040! Constantiaberg, 550 m., *Schlechter* 543! Steenberg Flats, July, *Wolley Dod* 2741! 'Cape,' *Hooker* 608! *Reynoud ex herb. Kunth. in herb. Berol.!*

The spreading perianth segments with their elongated aicular tips are a marked feature of this species, *see* fig. 12.

T. aggregatum, *A. W. Hill*; species *T. diversifolia*, Sond., et *T. spicata*, L., affinis, ab illa bracteis margine fimbriatis, ab hac foliis superioribus paucis subulatis ascendentibus praecipue differt.

Caules et rami ascendentes, subteretes, glabri. *Folia* parva, plana, ad caulem appressa, lanceolata vel lineari-lanceolata, acuta, 3-4 mm. longa, rigida, sicco nigrescentia, glabra. *Flores* in capitulos terminales subcapitatos vel spicas oblongo-lineares conferti. *Bracteae* ovatae, acute acuminatae, costa lata carnosa, marginibus subtranslucentibus viridibus lacerato-denticulatis, glabrae; bracteolae floribus aequales sed multo angustiores, ceterum eis similes. *Perianthium* 3-4 mm. longum, intra faucem pubescens; segmenta circiter 3 mm. longa, linearia, subacuta, apice rigide pectinato-barbata. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stigma* sessile. *Fructus* ellipsoideus, 6 mm. longus, prominenter 10-costatus, inter costas delicate reticulatus.

Vanrhynsdorp Div., Windhoek, 305 m., Aug., *Schlechter* 8348! Clanwilliam Div.; Lammskraal, 375 m., Sept., *Diels* 779! Malmesbury Div.; near Hopefield, Sept., *Bachmann* 1694! 1695! Darling, 30 m., Oct., *Schlechter* 5337! Cape Div., near Capetown, 30 m., June, *Bolus* 1360! Wynberg, Oct., *Bolus* 2931! 25 m., Feb., *Schlechter* 7545! Muizenberg, 300 m., Jan., *Bolus* 2933 partly! Kenilworth, 30 m., Jan., *Bolus* 7049! Hertzog House Retreat, Dec., *Wolley Dod* 2364! near Vygerskraal, Dec., *Wolley Dod* 2371! South Africa; without precise locality, *Wallich! Osbeck in Herb. Stockholm! Zeyher* 4879!

T. annulatum, *A. W. Hill*; species sectionis *Annulatae* foliis densis subimbricatis distincta.

Planta parva, probabiliter usque ad 10 cm. alta, e basi ramosa; rami pauci, ascendentes, subteretes, glabri, in parte inferiore foliis nigrescentibus persistentibus induti. *Folia* subdense disposita, cum caule subparallela, linearia vel lineari-lanceolata, acuta, 4–6 mm. longa, supra concava vel plana, infra rotundata, crasse carnosa, glabra. *Flores* in capitula densa subglobosa 6–8 mm. diametro dispositi. *Bracteae* lineari-oblongae, acutae, floribus subaequales, carnosae, leviter carinatae; bracteolae bracteis subaequales sed angustiores. *Perianthium* 2·5 mm. longum, glandulis externis conspicuis et intra faucem pilorum annulo instructum; segmenta ovata, obtusa, 1·5 mm. longa, plana, apice dense lanato-barbata. *Antherae* 0·4 mm. longae, e perianthii tubo leviter exsertae. *Stigma* subsessile. *Fructus* non visus.

Worcester Div.; Matroosberg, 2000 m., Dec., *Marloth* 2252 partly (Herb. Marloth, not of herb. Bolus)!

T. asperifolium, *A. W. Hill*; species *T. pallido*, A.D.C., affinis, ramis et foliis scabridulis praecipue differt.

Suffrutex vel herba. *Caules* ramosi, tenues, circiter 40 cm. alti, angulares, scabriduli; rami ascendentes, foliosi, scabriduli. *Folia* linearia vel lineari-lanceolata, subacuta, circiter 1·8 cm. longa, carinata, scabridula. *Flores* in cymas laxas dispositi; bracteae plus minusve lanceolatae, acutae, floribus aequales vel paulum longiores, dorso et marginibus scabridulae; bracteolae floribus breviores. *Perianthium* 1·5-1·75 mm. longum, segmentis ovatis subacutis 0·75–1 mm. longis subcucullatis. *Discus* conspicuus. *Antherae* e perianthii tubo exsertae, 0·25 mm. longae. *Stylus* crassus, 0·35 mm. longus. *Fructus* globosus, 4 mm. longus, costis conspicuis reticulationibus laevibus.

George Div.; on hill near George, *Schlechter* 2358! Queenstown Div.; Table Mountain, *Drège* 8170b!

T. asterias, *A. W. Hill*: species perianthii segmentis elongatis apice barbatis marginibus incurvis tenuiter pubescentibus, stigmate sessili discreta.

Rhizoma crassum, multi- vel pauci-cephalum; caules erecti, superne ramosi, compressi et angulati, sicco purpurei, glabri. *Folia* acicularia, supra canaliculata, acuta, 0·6–2·5 cm. longa, 0·6 mm. crassa, glabra. *Flores* in racemos laxos vel cymularum racemos dispositi. *Bracteae* pedunculo partim adnatae, lineares, acutae, usque ad 5 mm. longae, floribus breviores vel longiores; bracteolae floribus breviores. *Perianthium* 3·5 mm. longum, glandulis magnis rotundatis externis instructum; segmenta lanceolata, 2·5 mm. longa, apice barbata, marginibus incurvis tenuiter pubescentibus. *Antherae* 0·5 mm. longae, ad segmentorum basin exsertae. *Stigma* sessile. *Fructus* ovoideus, perianthio longo persitente 7 mm. longus, prominenter 10-costatus, inter costas tenuiter reticulatus.

Transvaal; Shilouvane, *Junod* 749a! Champs du Sanatorium, *Junod* 837! Aapies Poort, Pretoria, *Rehmann* 4013! Houtbosch, *Rehmann* 5958! 5959! Swaziland; Havelock Concession,

1220 m., *Saltmarsh* 1008 (in Herb. Galpin)! Natal; Gerrard 333! *Sanderson* 916! near Murchison, *Medley Wood* 3003!

The elongated perianth segments are a conspicuous feature in this species, with the relatively small beard at the apex and finely puberulous margins. The external glands are also well developed. *See* fig. 9.

T. Burchellii, A. W. *Hill*; species ramulis lateralibus numerosis dense foliatis, floribus solitariis ad ramulorum apices dispositis distincta.

Planta fruticosa; rami (vel caules?) leviter angulati, pallide brunnei, glabri; ramuli laterales satis dense foliosi, ascendentes. *Folia* linearia vel lineari-acicularia, apice cartilaginea, acuta, 7–10 cm. longa, subteretia vel subangularia, glabra. *Flores* ad ramulorum apices solitarii vel subsolitarii. *Bracteae* floribus longiores, lineares, foliis similes; bracteolae flores aequantes vel eis paullo longiores. *Perianthium* 2 mm. longum, extra eglandulosum; segmenta ovato-elliptica, subacuta, 1·5 mm. longa, cucullata, apice barbata. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* 1 mm. longus, ad antherarum apices attingens. *Fructus* ellipsoideus, basi acutus, 6 mm. longus, prominenter 10-costatus, inter costas reticulatus.

Bechuanaland; near the source of the Kuruman River at Little Klibbolikhonni, *Burchell* 2504!

T. Burkei, A. W. *Hill*; species floribus in racemos vel cymularum racemos dispositis, *T. orientali*, A. W. Hill et *T. palliotato*, A. W. Hill, affinis, ab illa perianthiis minoribus, ab hac bracteis elongatis pedunculis longe adnatis praecipue differt.

Caules graciles, sulcati vel carinati, glabri. *Folia* linearia, acuta, circiter 9 mm. longa, glabra. *Flores* in cymulas 1–3-floras pedunculatas racemosas laxas dispositi; bracteae pedunculi apice adnatae, lineares, acutae, floribus circiter aequales, marginibus minutissime scabridis; bracteolae quam bractea paullo breviores. *Perianthium* 1·25 mm. longum, glandulis externis conspicuis instructum; segmenta lineari-lanceolata, subacuta, circiter 1·25 mm. longa, apice barbata, marginibus incurvis. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* circiter 0·75–1 mm. longus, ad antherarum apices attingens. *Fructus* ellipsoideus, 4 mm. longus, valide 10-costatus, inter costas reticulatus.

Bechuanaland; near the sources of Kuruman River, *Burchell* 2493 1! Barolong Territory, May, *Holub*! Transvaal; Kimberley, *Marloth*! Magaliesberg, *Burke*! *Zeyher* 1500 partly in Herb. Kew! Boshveld, between Elands River and Klippan, *Rehmann* 5013! near Komati Poort, Aug., *Bolus* 9765! Dec., 330 m., *Schlechter* 11803. Delagoa Bay; Tembé, Sept., *Junod* 325! Natal; near Maritzburg, Sept., *Schlechter* 3288! without precise locality, *Sanderson*! coastland, up to 350 m., Feb., *Sutherland*!

T. coriarium, A. W. *Hill*; species foliis et bracteis coriariis, bracteis elliptico-lanceolatis, glandulis externis magnis distincta.

Caules e rhizomate nodoso parvo solitarii vel subsolitarii, parce ramosi, erecti, circiter 10 cm. longi, prominenter costati, subglauci, glabri. *Folia* pauca, late linearia, obtusa vel subacuta, 0·8–1·3 cm. longa, 1·5–2 mm. lata, infra leviter carinata et glauca, glabra, crassa, carnosa. *Flores* albi, pauci, in racemos laxos dispositi, in bracteārum axillis solitarii. *Bracteae* pedunculo usque ad 2 mm. longo adnatae, elliptico-lanceolatae, obtusae, plus minusve cymbiformes, floribus longiores, integrae; bracteolae bracteis paullo breviores. *Perianthium* 5 mm. longum, glandulis externis magnis conspicuis instructum; segmenta ovato-lanceolata, obtusa, 2·5 mm. longa, apice pilis lanatis dense barbata. *Antherae* ad tubi apicem insertae, 1 mm. longae. *Stylus* 1 mm. longus, ad antherārum basin attingens. *Fructus* non visus.

Orange River Colony; Harrismith, Nov., *Sankey* 223!

The large external glands are a conspicuous feature in this species (*see* fig. 8) and appear to be the largest examples in the genus. The apical beard is also dense and the long hairs extend down the margins of the perianth segments. In its leathery leaves and bracts in addition to the above-mentioned features this species stands somewhat apart from all others.

T. cornigerum, A. W. *Hill*; species *T. palliolato*, A. W. Hill, affinis, sed racemis elongatis distinctis, cymulis cornigeris, glandulis conspicuis facile distinguenda.

Caules elongati, pergraciles, sulcatuli, glabri; rami interdum omnino floriferi. *Folia* linearia, acutissima, 1·5–2·5 mm. longa, supra 1-nervia, glabra. *Cymulae* racemose dispositae, 3-multiflorae. *Bracteae* floribus breviores, corneis similiter dispositae, lineares, acutae, pedunculo breviter adnatae; bracteolae bracteis multo breviores sed ceterum eis similes. *Perianthium* 1·5 mm. longum, glandulis ovoideis externis prominentibus instructum; segmenta 1·25 mm. longa, ovato-oblonga, subacuta, cucullata, apice barbata, marginibus papillosis. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* 0·5 mm. longus, ad antherārum apices attingens. *Fructus* non visus.

Natal: Mooi River, 1200–1530 m., Apr., *Medley Wood* 4487! 5344! near Stanger, 50 m., *Medley Wood* 10,193! Natal and Zululand, without precise locality, *Gerrard* 1278.

T. costatum, A. W. *Hill*; species *T. racemoso*, Bernh., affinis, foliis costatis rigidis, floribus pedunculatis distinguenda.

Rhizoma gracile, erectum; caules pauci vel subnumerosi, superne ramosi, costati vel angulares, glabri. *Folia* laxe disposita, linearia, acute acuminata, 0·6–1·2 cm. longa, plana, utrinque costa prominente, glabra. *Cymulae* 1–3-florae. *Bracteae* pedunculo breviter adnatae, 0·6–1 cm. longae, ceterum foliis similes; pedunculi bracteis breviores vel paulum longiores, compressi, subgraciles; bracteolae floribus breviores vel longiores, lineares, acutae, glabrae. *Perianthium* 2·5–3 mm. longum; segmenta triangulari-lanceolata, 1·5 mm. longa, cucullata, marginibus fimbriatis membranaceis, cucullo rostratro et leviter papilloso. *Antherae* 0·75 mm. longae. *Stylus* 1·5 mm. longus, antheris superans. *Fructus* campanulato-globosus, perianthio persistente

incluso circiter 6 mm. longus, prominenter 10-costatus, inter costas crasse reticulatus.

Orange River Colony; Bethlehem, *Richardson*! Basutoland; Leribe, Dec., *Dieterlen* 647! Transvaal; near Pretoria, Nov., *Wilms* 1308a! Swaziland; near Bremersdorp, 780 m., Jan., *Bolus* 12,273! near Mbabane, 1410 m., Jan., *Bolus* 12,277! Griqualand East; *Tyson*! Natal; near Camperdown, 1000 m., Dec., *Schlechter* 3284! Weenen, 1050 m., Jan., *Wood* 3582! between Pietermaritzburg and Greytown, Nov., *Wilms* 2252! near Pietermaritzburg, *Wilms* 2254! near Emberton, Dec., *Schlechter* 3239! Inanda, *Wood* 1141! without precise locality, *Gerrard* 1281!

var. **juniperina,** *A. W. Hill*, var. nov.; folia in ramis dense conferta, quam typus plus acuta.

'Natal and Zululand,' *Gerrard* 1280!

T. cupressoides, *A. W. Hill*; species *T. ericaefolio*, A.DC., affinis, foliis planis longioribus conspicue differt.

Suffrutex dense ramosus, glaber, circiter 20 cm. altus, ramis lignosis ascendentibus, ramulis numerosis foliolosis. *Folia* linearia, acuta, 4–7 mm. longa, supra plana, infra paullo carinata, subcarnosa, glabra. *Flores* ad ramulorum apices in inflorescentias breves aggregati; bracteae et bracteolae lanceolatae, floribus longiores. *Perianthium* 1·5 mm. longum, disco et glandulis externis conspicuis instructum, segmentis ovatis obtusis 1 mm. longis cucullatis glabris. *Antherae* 0·2 mm. longae, e perianthii tubo exsertae. *Stigma* subsessile. *Fructus* ignotus.

Natal; Niginya, 1680 m., *Wylie in Herb. Wood* 10,618!

T. cuspidatum, *A. W. Hill*; species *T. capitulifloro*, Sonder, affinis, plantis robustioribus, foliis bracteis et floribus majoribus praecipue differt.

Frutex humilis, lignosus, multo ramosus. *Caulis* subteres, glaber; rami leviter costati. *Folia* pauca et sparsa; inferiora acicularia, apice subacuta et cartilaginea, circiter 1–3 cm. longa, subteretia, glabra; superiora suberecta ad caulem plus minusve adpressa, triangulari-lanceolata, acuta, circiter 4 mm. longa. *Flores* ad ramulorum apices glomerati, subcorymbosi. *Bracteae* et bracteolae confertae; bracteae obovato-ellipticae, cuspidato-acuminatae, floribus fere aequilonges, marginibus membranaceis subscariosis; bracteolae bracteis similes sed eis minores et paulum angustiores. *Perianthium* 2–2·5 mm. longum; segmenta lanceolato-triangularia, acuta, cucullata, apice lanato-barbata. *Antherae* 0·5 mm. longae, in perianthii tubo inclusae. *Stylus* 0·25–0·3 mm. longus, robustus, ad antherarum bases vel paulum supra attingens. *Fructus* ellipsoideo-globosus, perianthio persistente longe rostratus, 4 mm. longus, prominenter 10-costatus, inter costas conspicue reticulatus.

Cape Div.; south-west part of Devil's Peak, Aug., *Wilms* 3611! Caledon Div.; Zwart Berg, *Ecklon and Zeyher* 47! Bredasdorp Div.; Elim, 150 m., Apr., *Schlechter* 7664! (in Herb. Bolus. 7666 & in Herb. Berol.). Riet Fontein Poort, near Elim, Dec., 45 m., *Bolus* 8597!

T. cytisoides, A. W. *Hill*; species ramis elongatis foliosis erectis, floribus solitariis terminantibus distincta.

Caules pauci, e rhizomate ramoso orti, erecti, profunde sulcati et costati, glabri; rami erecti, parce foliosi. *Folia* anguste linearia-acicularia, acuta, 0·8–1·2 cm. longa, circiter 0·5 mm. crassa, sicco verrucosa, supra costa crassa prominente. *Flores* ad ramorum apices solitarii, sessiles. *Bracteae* pedunculo partim adnatae, lineares, acutae, flores subaequantes; bracteolae floribus breviores, lineari-subulatae, carnosae, glabrae. *Perianthium* 2·5 mm. longum; segmenta ovato-lanceolata, 1·5 mm. longa, cucullata, apice pilis paucis longis barbata. *Antherae* e perianthii tubo exsertae, 0·75 mm. longae. *Stylus* 0·5 mm. longus. *Fructus* ellipsoideus, 5 mm. longus, sicco rubro-brunneus et prominenter costatus, inter costas non reticulatus.

Transvaal; Waterval Onder, Jan., *Jenkins in Herb. Mus. Transvaal* 6767!

T. disciflorum, A. W. *Hill*; species *T. acutissimo*, A.DC., affinis, sed omnino minute scabrida differt.

Caules debiles, probabiliter procumbentes, e basi multo ramosi; rami graciles, subteretes, minute scabridi, sicco rubro-brunnei. *Folia* numerosa, linearia, acute mucronata, 4–6 mm. longa, infra convexa, supra plana, demum recurvata, minute scabrida, satis carnosa. *Flores* solitarii. *Bracteae* et bracteolae floribus longiores; bracteae foliosae, pedunculo adnatae; pedunculi brevissimi; bracteolae 2, bracteis circiter dimidio breviores, acute mucronatae. *Perianthii segmenta* triangularia, 0·75 mm. longa, cucullata, glabra. *Antherae* e perianthii tubo exsertae. *Stylus* 0·75 mm. longus, ad antherarum basin attingens. *Fructus* ellipsoideus, perianthio persistente coronatus, 4 mm. longus, 2 mm. diametro, costatus et reticulatus, glaber.

Graaff Reinet: in grassy places on Mt. Tandjesberg, *Bolus* 1967!

T. fimbriatum, A. W. *Hill*; species ex affinitate *T. capitato*, L., et *T. carinato*, A.DC., foliis sparsis, perianthii tubo lobisque brevioribus, stylo breve distinguenda.

Frutex parvus circiter 30 cm. longus, e basi ramosus; rami ascendentes, foliorum basibus persistentibus asperati. *Folia* linearia, subacuta, inferne ad caulem arcte adpressa, superne leviter recurvata, 6–8 mm. longa, supra plana, infra leviter carinata, glabra. *Flores* in glomerulos capitatos terminales densos 0·8–1· cm. diametro dispositi. *Bracteae* late ovatae, acute acuminatae, floribus longiores, marginibus membranaceis fimbriatis; bracteolae bracteis similes sed multo angustiores et breviores. *Perianthium* 3·25 mm. longum, glandulis externis conspicuis instructum; segmenta lineari-lanceolata, 2·5 mm. longa, cucullo conspicuo 1 mm. longo, pilis brevibus paucis barbata. *Antherae* in perianthii tubo inclusae, 0·5 mm. longae. *Stylus* 0·5 mm. longus, ad antherarum medium attingens.

Tulbagh Div.; eastern base of the Roodesand Mts., 150 m., Sept., *Diels* 1125!

T. floribundum, A. W. *Hill*; species *T. pallido*, A.DC., affinis

ramulis acute costatis, foliis et bracteis carinatis, cymulis laxis elongatis praecipue differt.

Caules erecti, e medio ramosi, prominenter costati, glabri; rami ascendentes, graciles, flexuosi. *Folia* linearia, acuta, 0·8–2·5 cm. longa, ad 1 mm. lata, subcarnosa, glabra. *Inflorescentia* e cymulis 3–5 floris constituta, in ramorum parte superiore paniculata. *Bracteae* pedunculo breviter adnatae, foliosae, carinatae: bracteolae floribus longiores, lineari-lanceolatae, acutae. *Perianthium* 1·5 mm. longum, disco interno instructum; segmenta triangularia, 0·75 mm. longa, carnosa, cucullata, marginibus plus minusve papillosis. *Antherae* vix e perianthii tubo exsertae, 0·25 mm. longae. *Stylus* robustus, brevissimus. *Fructus* oblongo-ellipsoideus, perianthio persistente coronatus, 4 mm. longus, 2·5 mm. diametro, prominenter 10-costatus, inter costas reticulatus et saepe leviter glaucus.

British Kaffraria, *Cooper* 138! Transvaal; near Wonderfontein Railway Station, 1835 m., *Bolus* 12,278! Griqualand East; Mt. Currie, 1590 m., *Tyson* 1838! 1230! Tembuland; Tabasi, near Bazeia, 764 m., *Baur* 336 partly! Pondoland; Port St. John, Summit West Gate, 366 m., *Galpin* 3467! Natal; Port Shepstone, *Rogers*! Alexandria District; Dumisia, 600 m., *Rudatis* 472! Malvern, near Durban, 150–180 m., *Medley Wood* 4971! near Newcastle, 900–1200 m., *Medley Wood* 7186! Inanda, 540 m., *Medley Wood* 154! 249! without locality, *Mrs. Saunders*!

T. fruticosum, A. W. *Hill*; species fruticosa, foliis paucis, perianthii segmentis margine papillosis, sinubus inter segmentis latis distincta.

Frutex 1–1·75 m. altus; caulis teres, cortice transverse rupto obtectus, basi usque ad 2 cm. crassus, inferne simplex, superne 4–6-ramosus, ramis 2-vel 3-divisis; ramuli ascendentes, leviter angulati vel compressi, glabri. *Folia* mox decidua, lineari-oblonga, obtusa, recurvata, 6–9 mm. longa vel interdum ad 2 cm. longa, carnosa, infra convexa, supra plana vel concava, glabra. *Cymulae* 1–3-florae, in racemos spiciformes laxos dispositae. *Bracteae* floribus breviores, a pedunculo brevissimo plus minusve liberae, usque ad 5 mm. longae, suberassae, cymbiformes, obtusae; bracteolae 2, floribus dimidio breviores, lineari-lanceolatae, acutae. *Perianthium* latum, cupulare, disco conspicuo instructum, 2 mm. longum, inter segmenta sinubus latis; segmenta late triangularia, 1 mm. longa, leviter cucullata, apice marginibusque papillosa. *Antherae* rotundatae, in perianthii tubo inclusae, 0·5 mm. longae. *Stylus* 0·25 mm. longus. *Fructus* ellipsoideo-globosus, basi contractus, perianthio persistente 6 mm. longus, basi prominenter 5-costatus, inter costas minus prominenter costatus et reticulatus.

Uitenhage Div.; Zuurberg Mts., Oct., *Mrs. Paterson* 35! Albany Div.; Howison's Poort Hills, Grahamstown, 660 m., *Galpin* 2900! Mountain slopes facing the sea, *MacOwan* 2094! in hills near Grahamstown, *Bolus* 1558! Featherstone Kloof, 610 m., *Schönland* 567! without precise locality, *Atherstone* 58! *Cooper* 56! Queenstown, *Cooper* 3045!

T. glaucescens, *A. W. Hill*; species inter species floribus in capitulis exiguis instructis et praecipue *T. repando,* A. W. Hill. affinis, sed ramis subaphyllis, foliis minutis, antheris e perianthii tubo exsertis distinguenda.

Fruticosus; rami 0·25–0·6 m. longi, diffusi, roseo-glauci, glabri; ramuli divaricati, fere aphylli, subteretes. *Folia* minima et pauca, linearia, obtusa, 1·5–3 mm. longa, rigida, glabra. *Flores* pauci, ad ramulorum apices in glomerulos parvos dispositi. *Bracteae* inconspicuae, floribus multo breviores, lanceolatae, subacutae, supra concavae, galbrae; bracteolae minimae. *Perianthium* cylindricum, 1·5 mm. longum; segmenta lanceolata, subobtusa, 1·35 mm. longa, apice pilis longis barbata. *Antherae* e perianthii tubo exsertae, 0·75 mm. longae. *Stylus* 0·5 mm. longus, ultra antherarum apices attingens. *Fructus* ovoideus, 4 mm. longus, crasse 10-costatus, inter costas glaucus et tenuiter reticulatus.

Swellendam Div.; Zondereinde River, in dry plains, Jan., *Burchell* 7513!

T. glomeratum, *A. W. Hill*: species *T. pubescente,* A.DC., similis, sed omnino glabra, foliis subsparsis distincta.

Caules ascendentes, graciles, parce ramosi, paululum scabridopuberuli; rami graciles, sulcati, glabri vel fere glabri. *Folia* linearia, acuta, supra plana vel concava, infra interdum carinata, 6-8 mm. longa, glabra vel marginibus leviter scabrida. *Flores* in racemos brevissimos vel capitulos parvos dispositi. *Bracteae* ovato-lanceolatae, acutae, floribus subaequales, carinatae, marginibus minutissime ciliatis; bracteolae bracteis triente breviores, eis angustiores sed ceterum similes. *Perianthium* 3–3·5 mm. longum; segmenta 1 mm. longa, lineari-lanceolata, acuta, apice dense barbata. *Antherae* in perianthii tubo inclusae, 1·5 mm. longae. *Stylus* 1·5 mm. longus, fere ad antherarum apices attingens. *Fructus* oblongus, circiter 6 mm. longus, in sicco virescens, basi praesertim subconspicue 5-costatus, costis intermediis inconspicuis.

George Div.; George district, Nov., *Bolus* 2458! Uniondale Div.; Long Kloof, 90 m., Aug., *Schlechter* 8399!

T. gracilarioides, *A. W. Hill*; species dense foliosa, bracteis elongatis, perianthii glandulis conspicuis, stigma subsessile distincta.

Caules e basi ramosi, usque ad 30 cm. alti; rami subdense foliati, ascendentes, angulati, glabri. *Folia* lineari-acicularia, acuta, 0·6–1·3 cm. longa, circiter 0·75 mm. crassa, dorso carinata, glabra, supra costa subprominente. *Flores* in cymulas racemosas foliosas terminales dispositi. *Bracteae* pedunculo adnatae, foliis similes, marginibus angustis subtranslucentibus, floribus duplo longiores; bracteolae flores aequantes vel eis paullo longiores. *Perianthium* urceolatum, glandulis prominentibus instructum, circiter 2 mm. longum; segmenta lineari-lanceolata, subacuta, cucullata, 1·25–1·5 mm. longa, apice pilis paucis barbata, marginibus incurvis. *Antherae* ad segmentorum basin vel fere in tubo insertae, 0·25–

0·35 mm. longae. *Stigma* sessile vel subsessile. *Fructus* ovoideus, 4-5 mm. longus, tenuiter 10-costatus, inter costas manifeste reticulatus.

Transvaal; grassy mountain sides of Saddleback Range, Barberton, 1200-1500 m., *Galpin* 543! Swaziland; Havelock Concession, 1100 m., *Saltmarsh in Herb. Galpin* 1848!

T. gypsophiloides, *A. W. Hill;* species nulli arcte affinis ex affinitate *T. floribundo,* A. W. Hill, sed habitu gracile laxe patulo, foliis late linearibus vel lineari-lanceolatis, inflorescentiis paucifloribus laxe paniculatis, perianthiis urceolatis distincta.

Caules satis graciles, interdum copiose ramosi, tenuiter costati, glabri; rami graciles, patuli. *Folia* lineari-lanceolata vel late linearia, acutissima, 0·6-2·5 cm. longa, usque ad 3 mm. lata vel interdum angustissima, plana, prominenter 1-nervia, margine minute serrulata, glabra. *Flores* pauci, ad ramulorum apices dispositi; bracteae foliosae, pedunculo dimidium adnatae, carinatae; bracteolae flores aequantes vel eis breviores, acutae. *Perianthium* urceolatum, inferne dilatatum, 1·75 mm. longum; segmenta ovata, subacuta, 1·75 mm. longa, apice dense barbata. *Antherae* e perianthii tubo semiexsertae, in recessibus convexis subpendulae, 0·4 mm. longae. *Stylus* 0·25 mm. longus, interdum ad antherarum apices attingens. *Fructus* oblongo-ellipsoideus, 6 mm. longus, 10-costatus, inter costas valde reticulatus.

Natal; Umtwalumi, *Medley Wood* 573! 3105! near Verulam, *Medley Wood* 756! without precise locality, *Gerrard* 407! Transvaal; Queen's River valley, near Barberton, 550 m., *Galpin* 758!

T. helichrysoides, *A. W. Hill*; species *T. fallacei,* Schlechter, affinis, sed floribus in corymbos densos aggregatis, bracteis flavo-viridibus marginibus inconspicuis praecipue differt.

Caules elongati, usque ad 60 cm. longi, superne parce ramosi, virides, angulis angustis purpureis, glabri; rami suberecti. *Folia* linearia, subacuta, 1·3–4 cm. longa, fere 2 mm. lata, crassa et carnosa, supra plana vel leviter concava, glabra, marginibus anguste cartilagineis, sicco verrucosa. *Flores* in corymbos terminales subdensos dispositi. *Bracteae* sicco flavo-virides, lanceolatae vel oblongo-lanceolatae, subacutae, pedunculo breviter adnatae, ad floris apicem attingentes, glabrae et subcarnosae; bracteolae bracteis paullo breviores, ceterum eis similes. *Perianthium* 2·5 mm. longum, glandulis externis conspicuis instructum; segmenta lanceolata, obtusa, 1·75–2 mm. longa, profunde cucullata, apice dense barbata, marginibus incurvis papillosis. *Antherae* in perianthii tubo inclusae, 0·25 mm. longae. *Stigma* subsessile. *Fructus* breviter stipitatus, ellipsoideus, 6 mm. longus, prominenter 5-costatus et minus prominenter 5-costatus, inter costas tenuiter reticulatus, sicco flavo-viridis.

Riversdale Div.; between Garcia's Pass and Muis Kraal, Oct., 600 m., *Bolus* 11,375!

T. hispidulum, *Lam.*, var. **subglabra,** *A. W. Hill*, varietas a speciei minutissime hirsuta, perianthio et antheris majoribus, glandulis conspicuis praecipue differt.

T. conostylum, Schlechter in Engl. Bot. Jahrb. XVII. (1899), p. 117.

Clanwilliam Div.; Blauwberg, 367 m., *Schlechter* 8451! near Clanwilliam, in stony clefts of the hills, 245 m., *Leipoldt*, 500!

T. hirsutum, *A. W. Hill*; species *T. virenti*, E. Mey., affinis, sed omnino subdense puberula, stylo elongato, perianthii tubo elongato, ramis brevibus erectis distincta.

Rhizoma subgracile, ramosum; caules satis numerosi, subsimplices, erecti, leviter angulati, subdense puberuli. *Folia* linearia, apice acutissima et cartilaginea, plana, 0·6–1·2 cm. longa, 1-nervia, carnosa, marginibus scabrido-puberula. *Flores* in racemos bracteatos dispositi, in bractearum axillis solitarii; pedunculi 1–2·5 mm. longi; bracteae ad pedunculi apicem adnatae, plerumque bracteis multo longiores sed interdum eis aequales, foliosae, costa media et marginibus puberulae; bracteolae floribus plerumque leviter longiores, bracteis similes. *Perianthium* circiter 3 mm. longum, glandulis conspicuis externis instructum; segmenta 2 mm. longa, cucullata, glabra. *Antherae* 0·75 mm. longae. *Stylus* 1·5–2 mm. longus, supra antherarum apices attingens. *Fructus* late ellipsoideus, perianthio persistente 6 mm. longus, circiter 10-costatus, inter costas prominenter reticulatus.

Queenstown Div.; plains near Queenstown, 1100 m., *Galpin* 1585! Graaff Reinet Div.; near Graaff Reinet, Cave Mt., 1300 m., *Bolus* 525! Orange River Colony; Leeuw Spruit and Vrede Fort, *Barrett Hamilton in Herb. Mus. Brit.*! Transvaal; Heidelberg, Grootvlei Farm, *Gilfillan* 244 *in Herb. Galpin*!

The elongated perianth tube and style reaching to above the top of the anthers are shown in fig. 1 and should be compared with the similar figure (fig. 4) of *T. virens*, E. Mey.

T. hystricoides, *A. W. Hill*; species ramulis rigidis spinescentibus puberulis, fructibus costatis puberulis vix reticulatis valde distincta.

Frutex rigidus multo ramosus, ramulis rigidis spinescentibus basi contractis longitudinaliter rugosis minute puberulis. *Folia* minima, triangularia, rigide coriacea, acuta, extra paulum puberula. *Flores* solitarii, in bracteis distincte pedicellati. *Bracteae* ovatae, subacutae, glabrae; bracteolae minutae. *Receptaculum* tenuiter pubescens, costatum. *Perianthium* fere 2 mm. longum; segmenta ovata, obtusa, 1·5 mm. longa, apice et marginibus pilis satis longis barbata. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* crassus, 0·5 mm. longus, circiter ad antherarum medium attingens, stigmate subcapitato. *Fructus* ovoideo-globosus, stipitatus, circiter 4 mm. longus, valide 10-costatus, breviter puberulus, inter costas vix reticulatus.

Griqualand West; between Griqua Town and Spuigslang, *Burchell* 1699!

T. Hystrix, *A. W. Hill*; species habitu *T. rigido*, Sond., similis, sed foliis squamaeformibus, perianthii segmentis fimbriatis facile distinguenda.

Fruticosus rigidus multo ramosus; ramuli spinescentes, interdum flexuosi, basi contracti, sicco crasse et crebre longitudinaliter rugosi vel sulcati, glabri. *Folia* parva, plus minusve triangularia, crassa et coriacea, leviter mucronata, glabra. *Flores* solitarii, in bracteis sessiles. *Bracteae* minimae, late ovatae, leviter mucronatae, glabrae; bracteolae minutae. *Receptaculum* glabrum. *Perianthium* 1·5 mm. longum; segmenta triangulari-ovata, cucullata, 0·75 mm. longa, apice et marginibus pilis satis longis barbata. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae; filamenta antheras subaequantes. *Stylus* brevis, ad antherarum basin attingens, 0·25 mm. longus. *Fructus* ovoideo-globosus, fere 4 mm. longus, valide 10-costatus, crasse 10-costatus, inter costas glaucus.

Graaff Reinet Div.; near Graaff Reinet, 750 m., *Bolus* 523! Middleburg Div.; Conway Farm, 1000 m., *Gilfillan* 5503! Bechuanaland; Alexandersfontein, 1230 m., *Galpin* 7000!

The fimbriated edges of the perianth segments mark off this species, *T. hystricoides* and *T. horridum*, from all others (*see* fig. 7). *T. Hystrix* has been confused with *T. rigidum*, Sond., which in turn was merged by De Candolle in *T. lineatum*, but it proves to be distinct and will be so retained in the *Flora Capensis*.

T. impeditum, *A. W. Hill*; species *T. phyllostachyo*, Sond., affinis, foliis apice recurvatis, antheris e perianthii tubo exertis, stylo distincto distinguenda.

Caules e rhizomate caespitosi, graciles, simplices vel parce ramosi, leviter angulosi, glabri. *Folia* linearia, apicibus recurvatis acutis, 0·4–1·4 cm. longa, plana, crassiuscula, glabra. *Flores* in spicas laxas dispositi, in bracteae quaeque axilla solitarii. *Bracteae* pedunculo leviter adnatae vel liberae, lineares, apice acutae et recurvatae, flores aequantes vel eis paulum longiores, supra planae, glabrae; bracteolae floribus dimidio breviores, bracteis similes. *Perianthium* 2 3 mm. longum; segmenta, anguste lanceolata, subacuta, 1·5 2 mm. longa, apice dense barbata. *Antherae* circiter 0·5 mm. longae, e perianthii tubo exsertae. *Stylus* 0·5 mm. longus, circiter antherarum basin attingens. *Fructus* ellipsoideo-globosus, 4·5 mm. longus, prominenter 10-costatus, purpureus, inter costas conspicue reticulatus. *T. Sonderianum*, Schlechter in Journ. Bot. 1898, 376 partim, quoad Bolus 526 partim.

Queenstown Div.; Kopje near Queenstown, 1000 m., *Galpin* 2157 partly in Herb. Kew! *Galpin* 1545! Hangklip, 1680 m., *Galpin* 5856! *Mund and Maire*! *Kolbe*! Graaff Reinet Div.; Sneeuwberg Mts. near Graaff Reinet, 1580 m., *Bolus* 526 partly! Orange River Colony; Bester's Vlei near Witzie's Hoek, 1620 m., *Bolus* 8249! Natal; near Durban, 900-1200 m., *Sutherland*! mts. above Estcourt, 1500 m., *Schlechter* 3357!

var. **rasa,** *A. W. Hill*; a typo perianthii segmentis pilis paucis brevibus barbatis differt.

Transvaal: Wonderboompoort, Pretoria, *Rehmann* 4544! Zuikerbosch Rand, 1700 m., *Schlechter* 3507!

T. junceum, *Bernh.*, var. **mammosa,** *A. W. Hill*; a typo gibba carnosula magna intra perianthii segmenta instructum differt.

Port Elizabeth Div.; near Port Elizabeth, Walmer. *Mrs. Paterson* 806!

This plant is remarkable for the white, egg-shaped protuberances on the inner faces of the perianth segments. The branches are rather weak and flexible, but plant in vegetative character agrees generally with *T. junceum*.

T. junceum, *Bernh.*, var. **plantaginea,** *A. W. Hill*, a typo spicis densis more *Plantago* distincta.

Transkei; Kentani, 305 m., *Pegler* 878 partly; near Zolora Mouth, *Pegler* 1302.

T. Junodi, *A. W. Hill;* species speciebus floribus in racemos simplices dispositis affinis, sed habitu tenue foliis anguste linearibus curvatis, glandulis externis conspicuis distinguenda.

Caules e basi ramosi; rami ascendentes, graciles, acute angulati vel fere alati, inter angulos sulcati, glabri. *Folia* linearia, acutissima, 0·6–1·3 cm. longa, infra carinata, supra subplana et prominenter 1-nervia, glabra. *Flores* solitarii, in bracteae et bracteolarum duarum axim subsessiles; bractea pedunculo brevissimo paulum adnata, foliis similis; bracteolae florem circiter aequantes, anguste lineares, acutae. *Perianthium* 2·75 mm. longum, glandulis externis conspicuis instructum; segmenta lanceolata, subacuta, 1·75 mm. longa, cucullata, apice barbata. *Antherae* e perianthii tubo exsertae, 0·65 mm. longae. Stylus 1·5–1·75 mm. longus, ad antherarum medium vel apicem attingens. *Fructus* elongato-ellipsoideus, perianthio persistente circiter 5 mm. longus, subconspicue costatus et reticulatus.

South Africa. Transvaal; Shilouvane. *Junod* 1301! (Herb. Boiss. and Herb. Zurich) without precise locality, *Wahlberg*! (Herb. Mus. Stockh.).

T. lacinulatum, *A. W. Hill* in Ann. Bolus Herb. ined.; species *T. rigido*, Sonder, quoad habitum similis ramis et floribus minute puberulis segmentis perianthii lacinulatis distincta.

Namaqualand. Great Karasberg, *H. H. W. Pearson* 7805!

The full description of this interesting plant collected by Prof. Pearson on his recent journey to the Great Karasberg, etc., under the auspices of the Percy Sladen Trust, will be published in the Annals of the Bolus Herbarium along with the descriptions of other plants collected during the expedition. The clothing of minute hairs over the whole plant including the outside of the perianth segments and the receptacle covering the ovary distinguishes this spinous species from all its allies. It is further peculiar and unique in having a large membranous flap or lacinula on either margin of the perianth segments in addition to and

distinct from the apical hood. The structure of the flower is well seen in fig. 5.

T. macrogyne, *A. W. Hill*; species inflorescentiis racemosis simplicibus, floribus speciosis, stylis supra antherarum apices elongatis, glandulis absentibus distinguenda.

Caules brevissimi, usque ad 13 cm. longi, simplices vel furcati, probabiliter e rhizomate orti, graciles, sulcati vel angulares, glabri. *Folia* linearia, apice cartilaginea, acuta, 0·8–1·1 cm. longa, circiter 1 mm. lata, infra leviter carinata, subcrassa et carnosa, glabra. *Flores* pauci, solitarii, axillares, breviter pedunculati. *Bracteae* ad pedunculi apicem adnatae, lineares, apice acute subulatae, flores aquantes vel eis paullo longiores, supra profunde concavae, marginibus minutissime serrulatae; bracteolae flores aequantes, bracteis angustiores. *Perianthium* album, 4 mm. longum glandulis non visis; segmenta oblongo-lanceolata, obtusa, 2 mm. longa, cucullata, plana, dense lanato-barbata. *Antherae* vix e perianthii tubo exsertae, fere 1 mm. longae. *Stylus* 2·25 mm. longus, antheris superans.

Orange Free State; Bethlehem, low lying veld, Oct., *Major A. J. Richardson*!

T. microcephalum, *A. W. Hill*; species *T. pycnantho*, Schltr., affinis, habitu et foliis imbricatis appressis obtusis facile distinguenda.

Rami subteretes, glabri; ramuli breves. *Folia* satis dense disposita, anguste lanceolata, subacuta, 2·25–4 mm. longa, circiter 1 mm. lata, crassa carnosaque, infra rotundata, supra plana vel concava, glabra. *Flores* pauci, in glomerulos terminales satis densos dispositi. *Bracteae* floribus breviores, rubescentes, foliis similes, carnosae, marginibus inferne tenuiter fimbriatis, glabrae; bracteolae bracteas fere aequantes et leviter carinatae. *Perianthium* circiter 2·5 mm. longum; segmenta lanceolata, obtusa, 1·25 mm. longa, extra rubescentia, cucullata, apice barbata, marginibus pubescentibus. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* 0·5 mm. longus, supra antherarum basin attingens, stigmate capitato. *Fructus* oblongo-ovoideus, 4 mm. longus, prominenter 10-costatus, inter costas crasse reticulatus.

Worcester Div.; Matroos, 2000 m., Dec., *Marloth* 2252! (in Herb. Bolus not in Herb. Marloth).

T. Nationae, *A. W. Hill*; species *T. racemoso*, Bernh., affinis, caulibus elongatis, foliis majoribus praecipue differt.

Caulis gracilis, subsimplex, ut videtur e rhizomate ortus, circiter 30 cm. altus, leviter flexuosus, costatus, glaber. *Folia* linearia, apice breviter acuto cartilagineo, 1–2·5 mm. longa, circiter 1 mm. lata, plana, carnosa, supra costa conspicua, glabra. *Flores* albi, pauci, in cymas 1-floras brevissime pedunculatas racemoso-dispositas dispositi, intra bracteas breviter stipitati. *Bracteae* pedunculo breviter adnatae, floribus multo longiores, plana et foliis persimiles; bracteolae floribus aequilonges vel paulum longiores, virides et bracteis similes sed angustiores. *Perianthium* 3–5 mm. longum; segmenta triangulari-elliptica,

1·25 mm. longa, cucullata, marginibus papillosis sed apice non barbata. *Antherae* e perianthii tubo semiexsertae, 0·75 mm. longae. *Stylus* 1·5–3 mm. longus, supra antherarum bases attingens.

Transvaal; Rustenburg, 1300 m., Dec., *Nation* 266!

This species is named in honour of Miss Olive Nation who has added considerably to our knowledge of the flora of the Transvaal.

T. nigrum, A. W. *Hill*; species *T. coriario*, A. W. Hill, affinis, bracteis lanceolatis acutis, perianthiis minoribus segmentis conspicue cucullatis praecipue differt.

Caules e rhizomate lato lignoso orti, prominenter costati et sulcati, glabri. *Folia* late linearia, acuta, recta, 1·3-2 cm. longa, plana, crassa et carnosa, sicco nigra, glabra. *Flores* in bracteis solitarii, subsessiles, in spicas laxas dispositi. *Bracteae* florem aequantes vel eis longiores, lineari-lanceolatae, acutae, integrae, glabrae; bracteolae bracteis paullo breviores. *Perianthium* glandulis externis magnis instructum, circiter 3 mm. longum; segmenta lineari-lanceolata, subacuta, 2 mm. longa, incurva et profunde cucullata, ad basin dense fimbriata et barbata. *Antherae* tubi apicem versus inclusae, 0·5 mm. longae. *Stylus* 1 mm. longus, ad antherarum apicem vel medium attingens. *Fructus* ovoideo-ellipsoideus, 7–8 mm. longus, prominenter 10-costatus, inter costas leviter reticulatus.

Orange River Colony, *Cooper* 826! 1061! Natal; between Pietermaritzberg and Greytown, *Wilms* 2253! Giant's Castle, 2745 m., *Guthrie* 4954! East Griqualand: near Kokstad, 1535 m., *Tyson* 1863!

T. nudicaule, A. W. *Hill*; species ramis subnudis singulis ex affinitate *T. stricti*, Berg., foliis squamiformibus, perianthii segmentis marginibus tenuiter ciliatis reflexis distinguenda.

Frutex divaricato-ramosus, efoliatus vel fere efoliatus; rami subteretes, circiter 2 mm. crassi, glabri. *Folia* superiora (vel bracteae?) bractiformia, ovato-triangularia, acute acuminata, circiter 1·5 mm. longa et lata, squamiformia, apicibus nigrescentibus, marginibus fimbriato-ciliatis, ceterum glabra. *Bracteae* foliis squamiformibus similes; bracteolae plus minusve lanceolatae, acutae, floribus circiter dimidio breviores, marginibus angustissime membranaceis minute serrulatis. *Perianthium* 2 mm. longum, glandulis conspicuis carnosis externis et disco interno instructum; segmenta triangulari-ovata, cucullata, 1·5 mm. longa, marginibus tenuiter ciliatis reflexis. *Antherae* e perianthii tubo exsertae, 0·4 mm. longae. Stylus 0·5 mm. longus, ad antherarum medium attingens. *Fructus* stipitatus, ellipsoideo-globosus, stipite 2 mm. longo, fere 6 mm. longus, prominenter 10-costatus, inter costas crasse reticulatus.

Clanwillian Div.; Olifant River, 150 m., Sept., *Schlechter* 8479! Malmesbury Div.: near Hopefield, Sept., *Bachmann* 15!

T. occidentale, A. W. *Hill*; species ex affinitate *T. stricti*, Berg., perianthiis majoribus segmentorum papillis marginalibus conspicuis, antheris et stylis longioribus distinguenda.

Rami elongati, leviter-angulati, sparse foliosi, glabri. *Folia* superiora ad caulem adpressa, linearia, acuta vel subacuta, 4–8 mm. longa, circiter 1 mm. crassa, carnosa, supra plana vel leviter concava, glabra. *Flores* in corymbos laxos terminales circiter 2 cm. diametro dispositi. *Bracteae* floribus multo breviores, lineari-lanceolatae, subacutae, circiter 3 mm. longae, leviter carinatae, glabrae; bracteolae lanceolatae vel ovato-lanceolatae, bracteis dimidio breviores. *Perianthium* 3·5 mm. longum; segmenta late triangulari-ovata, obtusa vel subacuta, 2 mm. longa, ebarbata, marginibus papillis conspicuis dense induta. *Antherae* e perianthii tubo exsertae, 0·8 mm. longae. *Stylus* 1 mm. longus, fere ad antherarum bases attingens. *Fructus* non visus.

Little Namaqualand; Modderfontein, *Whitehead*!

T. orientale, A. W. *Hill*; species *T. Burkei*, A. W. Hill, et *T. macrogyne*, A. W. Hill, affinis, ab illa perianthiis magnis, ab hac glandulis externis conspicuis praecipue differt.

Caules pauci, e rhizomate lignoso satis robusto orti, suberecti, angulares et sulcati, glabri; rami suberecti, parce foliosi. *Folia* linearia, acuta vel subacuta, 0·6–1·5 cm. longa, 1–1·5 mm. lata, crassa et carnosa, marginibus cartilagineis scabridulis, interdum costa media distincta vel infra plus minusve carinata, glabra. *Flores* pauci, in racemos foliatos dispositi, in bracteārum axillis solitarii. *Bracteae* pedunculo adnatae, lanceolatae vel ovato-lanceolatae, acute acuminatae, floribus longiores, marginibus cartilagineis scabridulis; bracteolae bracteis similes sed eis dimidio breviores. *Perianthium* urceolatum, circiter 4 mm. longum, glandulis externis instructum; segmenta lineari-lanceolata, obtusa, 2–3 mm. longa, cucullata, apice dense lanato-barbata. *Antherae* vix e perianthii tubo exsertae, circiter 1 mm. longae. *Stylus* 1·5 mm. longus, fere ad antherarum apices attingens. *Fructus* ovoideo-ellipsoideus, 6 mm. longus, conspicue 10-costatus, inter costas leviter reticulatus.

Stockenstrom Div.; Katberg, *Hutton*! Basutoland, Cooper 3094! Tembuland; Tabase, near Baziya, 764 m., Nov., *Baur* 336 in part! East Griqualand: near Kokstad, 1300 m., Oct., *Tyson* 3157!

T. Patersonae, A. W. *Hill*: species sectionis *Annulatae* floribus in capitula spicata dispositis *T. Frisea*, L., et *T. submudo*, Sond., affinis, ab illa capitulis compactis bracteārum marginibus integris, ab hac barbae capillis lanigeris praecipue differt.

Caulis circiter 22 cm. altus, e basi parce ramosus, leviter sulcatus, glaber; ramuli ascendentes. *Folia* linearia, acuta, subteretia vel supra subplana, 0·4–1·4 cm. longa, crassa, glabra. *Inflorescentia* e cymulis 3–5-floris in spicas circiter 1 cm. longas ovoideus terminales densas dispositis constituta. *Bracteae* lanceolatae, acutae, floribus breviores, sicco virides, glabrae, marginibus angustis membranaceis integris; bracteolae bracteis multo breviores. *Perianthium* urceolatum, 2·5 mm. longum, glandulis externis conspicuis et intra faucem pilis instructum; segmenta lanceolata, subacuta, 1·5 mm. longa, apice dense lanato-barbata,

marginibus papillosis. *Antherae* e perianthii tubo subexsertae, 0·5 mm. longae. *Stigma* sessile. *Fructus* non visus.

Port Elizabeth Div.; Walmer, *Mrs. Paterson* 682! 792!

T. patulum, A. W. *Hill*; species ex affinitate *T. funalis*, L., et *T. macrostachyi*, A.DC., sed ramis numerosis rigidis patulis, floribus stylo conspicuo instructis praecipue differt.

Caules divaricate ramosi, erecti, glabri; rami graciles, elongati, recti, a caule subangulo 45° abeuntes. *Folia* inferiora acicularia, acuta, 0·7–1 cm. longa, gracillima, dorso vel margine interdum dentata, ceterum glabra; superiora ramis subtendentia et leviter adnata, recurvata, linearia vel lineari-lanceolata, subacuta, usque ad 4 mm. longa, glabra. *Flores* in spicas elongatas flexuosas laxe dispositi, in bractarum axillis solitarii vel 3-nati. *Bracteae* floribus multo breviores, lanceolatae, subacutae, carnosae, circiter 2 mm. longae, glabrae; bracteolae bracteis paullo breviores sed eis ceterum similes. *Perianthium* 2 3·5 mm. longum, glandulis conspicuis externis instructum; segmenta lanceolata, subacuta, 2–2·5 mm. longa, marginibus et apice pilis robustis longis barbata, intra faucem pilorum annulo instructa. *Antherae* e perianthii tubo exsertae, 0·75 mm. longae; filamenta antheris aequilonga. *Stylus* robustus, 0·5 mm. longus. *Fructus* basi turbinatus, subglobosus, 6·5 mm. longus, satis prominenter 10-costatus, inter costas delicate reticulatus. *T. funale*, L. var. *caledonicum*, Sond. in Flora 1857, 359; A.DC. in DC. Prodr. xiv. 668.

Malmesbury Div.; near Mooreesberg, 140 m., *Bolus* 9981! Zwartland and region of Berg River streams, *Ecklon and Zeyher* 51 in herb. Berol. et Stockh.! Paarl Div.; near Paarl, 85 m., *Schlechter* 9207! Cape Div.; Devil's Peak. *Bergius*! South Africa; without definite locality, *Harvey* 711 partly!

The perianth in this species is large and with conspicuous external glands. The ring of golden-brown throat hairs is well developed and the base of the perianth is glandular and disc-like (*see* fig. 14).

T. penicillatum, A. W. *Hill*; species a speciebus alteris pilorum discretorum penicillo pone antheras sito et ab eis distincto **distinguenda.**

Caules erecti, longitudinaliter sulcati, robusti, lignosi, glabri, superne ramosi; rami erecti, subcorymbosi. *Folia* linearia, acute mucronata, 2·5–3 cm. longa, circiter 2 mm. lata, infra carinata, glabra, sicco rugosa. *Flores* in corymbos densos terminales usque ad 2·5 cm. diametro dispositi. *Bracteae* purpurascentes, linearioblongae, subacutae, carinatae, flores aequantes, ad 2 mm. latae, marginibus subtransluccntibus; bracteolae bracteis paullo breviores. *Perianthium* 2·25 mm. longum; segmenta linearilanceolata, subacuta, circiter 2.25 mm. longa, plana, cucullata, apice et marginibus pilis longis instructa. *Antherae* 0·25 mm. longae, in perianthii tubo inclusae, pilorum discretorum penicillo pone antheras sito et ab eis distincto. *Stylus* 0·25 mm. longus vel subnullus. *Fructus* robuste et breviter stipitatus, ellipsoideus, 6 mm. longus, subprominenter 5-costatus, nervis intermediis inconspicuis, inter nervos transverse **reticulatus.**

George Div.; Cradock Berg, 760 m., *Galpin* 4546; Humansdorp Div.; Storms river, 80 m., *Schlechter* 5986.

This species is the sole representative so far observed of the newly-constituted section *Penicillata*. The hairs behind the anthers are quite free, forming a loose pencil and are not attached to the anthers in any way (*see* fig. 13).

T. pleuroloma, *A. W. Hill*; species ramis prostratis, ramulis flexibilibus, perianthii segmentis lacinulis instructis nulli arcte affinis.

Herba vel suffrutex perennis, glabra, ramis prostratis elongatis sulcato-striatis circiter 20–40 cm. longis, ramulis elongatis flexibilibus. *Folia* sparsa, acicularia, 3–5 mm. longa, abrupte acuta. *Flores* in bracteārum axillis solitarii, pedicellati, in inflorescentias laxe racemosas dispositi. Bracteae subulatae, floribus breviores, 1·5–2 mm. longae, acute acuminatae, glabrae; bracteolae minutae. *Perianthium* 1·5 mm. longum, glandulis externis conspicuis; segmenta 0·75 mm. longa, ovata, cucullata, glabra, marginibus lacinulis membranaceis inflexis instructa. *Antherae* 0·5 mm. longae, e perianthii tubo exsertae, lacinulis tutatae. *Stylus* 0·5 mm. longus, ad antherarum basin attingens. *Fructus* ignotus.

Murraysburg Div.; near Murraysburg, *W. Tyson* 129 in Herb. Bolus! Carnarvon Div.; Karrebergen, *Burchell* 1566!

T. polygaloides, *A. W. Hill*; species floribus in racemos elongatos dispositis, ex affinitate *T. magalismontani*, Sond., bracteis flores aequantibus, stigma sessile praecipue differt.

Radix ut videtur annua, brevis, lateralibus longioribus patulis stramineis; caulis gracilis, superne ramosus, parce foliatus, subconspicue longitudinaliter costatus, glaber; rami erecti, graciles. *Folia* gracilia, linearia, acuta, 0·8–1·3 cm. longa, sicco nigra, glabra. *Flores* in cymulas 1-floras racemosas breves dispositi; cymulae breviter pedunculatae, foliis parvis 1–2 et bracteis 3 florem circumdatis. *Bracteae* lineares, florem aequantes; bracteolae acutae. *Perianthium* 1·5 mm. longum; segmenta elliptico-lanceolata, subacuta, 1 1·5 mm. longa, apice barbata et marginibus pubescentibus. *Antherae* 0·5 mm. longae, e basi segmentorum subexsertae. *Stigma* subsessile. *Fructus* ovoideus, 5 mm. longus, rubro-glaucus, subprominente 10-costatus et reticulatus.

Natal; Inanda, Clairmont, Oct., *J. M. Wood* 1095! in marsh near Clairmont, July, *Schlechter* 2976!

T. prostratum, *A. W. Hill*; inter species floribus in capitula exigua dispositis *T. selaginoeo*, A.DC., affinis, habitu prostrato et foliis acicularibus ascendentibus facile distinguenda.

Caules numerosi, e rhizomate erecto gracile prostrati, glabri, teretes; ramuli ascendentes, gracillimi, parce foliosi. *Folia* acicularia, subacuta, teretia, 0·8–1·25 cm. longa, carnosa, glabra. *Flores* ad ramulorum apices glomerati. *Bracteae* flores aequantes vel eis longiores, lineares vel lineari-lanceolatae, subacutae, glabrae. *Perianthium* circiter 1 mm. longum; segmenta triangularia, acuta, fere 1 mm. longa, apice marginibusque papillis

barbata. *Antherae* e perianthii tubo exsertae, 0·3 mm. longae. *Stylus* fere 0·5 mm. longus, ad antherarum medium vel apicem attingens. *Fructus* ovoideo-globosus, 3·5 mm. longus, prominenter 10-costatus, inter costas delicate reticulatus.

Ceres Div.; Skurjdeberg Range near Gydouw, Jan., 1600 m., *Schlechter* 10,008!

T. pungens, A. W. *Hill*; species *T. spinoso*, Linn., affinis, sed foliis rigidis subulatis praecipue differt.

Frutex multi-ramosus circiter 6 dm. altus, ramis congestis glaucescentibus. *Folia* ramis ad perpendiculum affixa pungentia, rigide subulata, apice acutissime spinosa, 4-7 mm. longa, subteretia, glaucescentia. *Flores* solitarii, in bractearum axillos dispositi; bracteae foliis similes; bracteolae minutae, ad basin pedicelli affixae. *Perianthium* 1·5–1·75 mm. longum, glandulis conspicuis externis instructum; segmenta triangulari-ovata, 0·5–0·75 mm. longa, subcucullata, plana, marginibus lacinulis membranaceis instructa. *Antherae* e perianthii tubo exsertae, 0·25–0·5 mm. longae. *Discus* conspicuus. *Stylus* 0·5 mm. longus. *Fructus* ellipsoideo-globosus, circiter 2·5 mm. longus, costis 10 et reticulationibus inconspicuis instructus.—*T. spinosum*, Drège, in Zwei Pflanzengeogr. Docum. 226 quoad *T. spinosum*, Drège e, non Linn. f.

Little Namaqualand; between Pedroskloof and Lilyfontein, 920–1225 m., *Drège* —*T. spinosum* e, in Herb. Kew. et Herb. Berol.; Kamiesberg Range at Karkamo, among bushes, *Pearson* 6684.

There has been some confusion in affixing the specimens *Zeyher* 1504 and *Drège* e both at Stockholm, Kew and the British Museum to the sheets. It is not clear whether *T. pungens* and *T. spinosum* have both been collected at Heerelogement or whether *T. spinosum* only is known from this locality. It would seem more probable that *T. pungens* is confined to Namaqualand.

T. repandum, A. W. *Hill*; inter species floribus in capitula exigua dispositis, *T. glaucescente*, A. W. Hill, affinis, foliis basalibus acicularibus antheris in perianthii tubo inclusis differt.

Frutex parvus, patulus, ramosus, circiter 15 cm. altus; radix erecta, gracilis, ramis longis horizontaliter patentibus pallide stramineis; caules patuli et ascendentes 3 vel 4, prominenter costati, glabri. *Folia* sparsa, recurvata, acicularia, acuta, 0·6–1 cm. longa, circiter 0·5 mm. crassa, glabra. *Flores* 3–4 ad ramulorum apices in glomerulos parvos dispositi, sessiles. *Bracteae* inconspicuae, floribus vix dimidio breviores, ovatae vel lanceolatae, acute acuminatae, marginibus plus minusve membranaceis, glabrae; bracteolae bracteis parte tertia breviores, ceterum eis persimiles. *Perianthium* 1·5–2 mm. longum; segmenta ovata, subacuta, plana, ecucullata, 0·75 mm. longa, marginibus et apice pilis longis dense barbata. *Antherae* in perianthii tubo inclusae, paulum supra 0·5 mm. longae. *Stigma* subsessile vel stylo brevissimo. *Fructus* oblongo-globosus, basi constrictus et stipitatus, 3 mm. longus, subprominenter costatus, inter costas reticulatus, sicco rubro-brunneus.

Malmesbury Div.; neighbourhood of Hopefield, between Lily-fontein and Rondekuil, Sept., *Bachmann* 2195!

T. rufescens, *A. W. Hill*; species *T. pubescente*, A.DC., affinis, foliis subsparsis, bracteis refuscentibus et floribus in spicas dispositis praecipue differt.

Caules rubro-brunnei, pergraciles, parce et divaricate ramosi, sulcati, pilis subreflexis breviter pubescentes; rami satis dense foliosi. *Folia* patula, linearia, acuta, 6–8 mm. longa, breviter pubescentia vel fere glabra. *Flores* in spicas densas oblongas terminales dispositi. *Bracteae* rufescentes, lineari-lanceolatae, acute acuminatae, floribus subaequales vel eis paullo longiores, carinatae, extra pubescentes, marginibus submembranaceis pubescentibus; bracteolae bracteis similes sed paullo breviores. *Perianthium* extra minute pubescens, 1·75 mm. longum; segmenta triangularia, subacuta, vix 1 mm. longa, marginibus leviter incurvis, intra dense barbata. *Antherae* e perianthii tubo semiexsertae, 0·5 mm. longae. *Stylus* vix 1 mm. longus, fere ad antherarum apices attingens. *Fructus* ovoideus, 4 mm. longus, prominenter costatus, inter costas distincte reticulatus.

Riversdale Div.; in fields near Riversdale, 90 m., Nov., *Schlechter* 1851!

T. Susannae, *A. W. Hill*; species habitu *T. foliosi*, A.DC., sed inflorescentiis in cymulas axillares racemoso-dispositis, perianthii segmentis subglabris, stigma subsessile distincta.

Caules erecti, lignosi, angulis rubris, glabri; rami ascendentes vel suberecti, foliati. *Folia* lineari-acicularia, plus minusve trigona, acuta, 1–1·5 mm. longa, circiter 0·75 mm. crassa, glabra. *Inflorescentia* e cymulis 3–5 floris breviter pedunculatis vel subsessilibus in racemos foliosos terminales dispositis constituta: pedunculi 2–4 mm. longi. *Bracteae* ad pedunculi apicem adnatae, floribus multo longiores, anguste lineari-lanceolatae, acutae vel subacutae, marginibus interdum subtranslucentibus et rufescentibus, infra convexae, supra concavae, glabrae, integrae; bracteolae quam bractearum pars libera dimidio breviores, ceterum eis similes. *Perianthium* 2–2·5 mm. longum, glandulis externis distinctis et intra disco lobato instructum; segmenta late triangulari-ovata, subacata, 1 mm. longa, cucullata, carnosa, glabra, marginibus vix papillosis. *Antherae* e perianthii tubo subexsertae, 0·25 mm. longae. *Stigma* subsessile. *Fructus* ellipsoideo-globosus, 5 mm. longus, prominenter 10-costatus, subcarnosus, inter costas vix reticulatus.

Riversdale Div.; Gysmans Hoek, June, *Muir in Herb. Galpin* 359! 5327! South Africa; without precise locality, *Krebs* 150! 175! specimen without indication of the collector in *Herb. Kew*!

Named in honour of Mrs. Muir, who has greatly assisted Dr. Muir in adding to our knowledge of the South African flora.

T. scirpioides, *A. W. Hill*; species *T. natalense*, Sond., affinis, sed ramis rigidioribus robustioribus, foliis ovatis squamiformibus, bracteis late ovatis acutis praecipue differt.

Caules lignosi, e rhizomate polycephalo lignoso satis numerosi,

e basi vel superne ramosi, conspicue sulcati, glabri, efoliati. *Flores* in spicas laxas erectas laxe corymbosi. *Bracteae* squamiformes, floribus multo breviores, late ovatae, acutae vel acute acuminatae, 1·5–2 mm. longae, carinatae, glabrae, marginibus brunneis anguste membranaceis; bracteolae bracteis similes sed eis paulum breviores. *Perianthium* 2·5 mm. longum; segmenta triangularia, acuta, plana, 1.5 mm. longa, apice dense lanato-barbata, marginibus pubescentibus. *Antherae* in perianthii tubo inclusae, 0·5 mm. longae. *Stigma* sessile vel subsessile. *Fructus* basi leviter contractus, ellipsoideo-globosus, 6 mm. longus. 2·75 mm. diametro, inconspicue 10-costatus, inter costas vix reticulatus.

Orange River Colony; Harrismith, 1650 m., Dec., *Sankey* 249! Besters Vlei, near Witzies Hoek, 1620 m., Dec., *Bolus* 8248! without precise locality, *Cooper* 834! Griqualand East; near Kokstad, 1290 m., Oct., *Tyson* 1535! Natal; Mooi river flat, 1200 m., Nov., *J. M. Wood* 4006!

T. sertulariastrum, *A. W. Hill*; species *T. euphrasioidei*, A.DC., affinis, caulibus minute puberulis floribus et fructibus minoribus praecipue differt.

Herba annua; caules multi-ramosi, subteretes, ramis congestis ascendentibus minute puberulis. *Folia* sparsa, inferiora acicularia, teretia, circiter 1–1·5 cm. longa, subobtusa, glabra; folia superiora subulato-lanceolata, glabra, apicibus nigrescentibus acutissimis 2 mm. longis. *Flores* 1–3 ad ramulorum apices dispositi, sessiles, bracteis bracteolisque linearibus vel ovato-lanceolatis acutissime acuminatis floribus brevioribus apicibus nigrescentibus marginibus submembranaceis fimbriatis circumdati. *Perianthium* ad basin globosum, 2 mm. longum, segmentis lineari-lanceolatis acutis 1·25 mm. longis apice cuculatis dense barbatis. *Antherae* in perianthii tubo inclusae, 0·4–0·5 mm. longae. *Stigma* subsessile. *Fructus* ellipsoideus, 1·5 mm. longus. costis 10 et reticulationibus distinctis.

Caledon Div.; Papies Vlei, *Schlechter* 10,448! Breadasdorp Div.; Rietfontein, *Bolus* 8597.

T. spartioides, *A. W. Hill*; species gracillima junciformis ex affinitate *T. confinis*, Sond., inflorescentiis abbreviatis, stylo elongato distincta.

Planta circiter 13 cm. alta; rhizoma circiter 5 mm. crassum. ramis furcatis; caules ascendentes, gracillimi, teretes, simplices vel parce ramosi, glabri. *Folia* ad caulem arcte adpressa, subulato-lanceolata, acute acuminata, 2–3 mm. longa, dorso convexa. glabra. *Flores* ramorum axillarium apices versus subconferti, in bractearum axillis sessiles. *Bracteae* squamatae, ovato-lanceolatae, acuminatae, marginibus minute fimbriatae, floribus circiter dimidio breviores; bracteolae bracteis similes sed angustiores. *Perianthium* 1·5 mm. longum; segmenta circiter 1 mm. longa. triangularia, acuta vel acuminata, barbata. *Antherae* 0·5 mm. longae, e perianthii tubo exsertae. *Stylus* 1 mm. longus, ad antherarum medium attingens. *Fructus* parvus, subglobosus,

perianthio persistente 3 mm. longus, prominenter 10-costatus, **inter costas tenuiter reticulatus.**

Transvaal; on the hills near Brug Spruit, 1500 m., Nov., *Schlechter* 3754!

T. subnudum, *L.*, var **foliosa,** *A. W. Hill;* caules foliis sparsis omnino obtecti.

Bredasdorp Div.; Elim, 153 m., *Schlechter* 7964! Port Elizabeth, *Bolus*!

T. translucens, *A. W. Hill*; species habitu *T. carinati,* A.DC., foliis densis appressis obtectis similis, perianthii segmentis elongatis cornaceis translucentibus apice breviter barbatis distinguenda.

Radix erecta, gracilis, cinereo-alba; caules usque ad 45 cm. longi, prope e basi ramosi; rami erecti vel ascendentes, angulares, glabri. *Folia* recta vel incurva, ascendentia, lineari-acicularia, acuta, 0·8 1·2 cm. longa, circiter 0·75 mm. crassa, supra plana, costa prominente, infra carinata, glabra. *Flores* in capitulos terminales bracteatos densos 0·6–1·2 mm. diametro dispositi. *Bracteae* floribus longiores, e foliis superioribus sensim evolutae, lanceolatae vel lineari-lanceolatae, acute acuminatae, rubescentes, carinatae, marginibus prope médium membranaceo-laceratis, glabrae; bracteolae bracteis paullo breviores et angustiores. *Perianthium* 4–5 mm. longum, tubo breve; segmenta linearilanceolata, apicibus translucentibus teretibus cornaceis acuta, apice breviter barbata, marginibus tenuiter papillosis. *Antherae* in perianthii tubo inclusae, 0·5 mm. longae. *Stigma* subsessile. *Fructus* non visus.

Caledon Div.; Houw Hoek, 764 m., Apr., *Schlechter* 7580! near Caledon, July, *Bolus*! Riversdale Div.; summit of Kampsche Berg, *Burchell* 7106!

T. umbelliferum, *A. W. Hill*; species floribus in corymbos dispositis, ex affinitate *T. fallacei,* Schlechter, et *T. helichrysoides,* A. W. Hill, sed foliis basalibus elongatis, bracteis inconspicuis, stylo elongato distinguenda.

Caules alti, erecti, lignosi, rotundate angulati, glabri; rami pauci, ascendentes. *Folia* magna et carnosa, subacicularia, obtusa, 2·5–5 cm. longa, circiter 2 mm. crassa, glabra. *Flores* in corymbos satis densos circiter 1·3 cm. diametro dispositi. *Bracteae* pedunculis brevissimis leviter adnatae, rubescentes, circiter ad florum apices attingentes, marginibus subtranslucentibus, glabrae; bracteolae bracteas fere aequantes sed eis paullo angustiores. *Perianthium* glandulis externis conspicuis instructum, 2·5 mm. longum; segmenta lanceolata, obtusa, 1·5 mm. longa, apice barbata, marginibus pubescentibus, leviter cucullata. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* vix 1 mm. longus, ad antherarum medium attingens. *Fructus* ovoideo-ellipsoideus, fere 4 mm. longus, subprominenter 5-costatus, costis intermediis minus conspicuis, inter costas reticulatus.

Prince Albert Div.; tops of the mountains of Zwartberg Pass, 1200 m., *Bolus* 11,633! 12,276! *Marloth* 2489b!

T. urceolatum, *A. W. Hill*; inter species sectionis *Annulatae* floribus in racemos dispositis, antheris in perianthii tubo inclusis distincta.

Caules lignosi, glabri; rami patuli, angulares, glauci. *Folia* robusta, in sectio semicircularia, supra plana vel leviter concava, linearia, subacute mucronata, 1–1·5 mm. longa, circiter 1 mm. lata, carnosa, subglauca, glabra. *Flores* satis magni, primum in spicas confertas dispositi, demum laxe racemosi, interdum 3-nati. *Bracteae* floribus breviores, lineari-lanceolatae vel oblanceolatae, acute mucronatae, crassae et carnosae, cymbiformes; bracteolae bracteis circiter parte tertia breviores sed ceterum eis similes. *Perianthium* 3 mm. longum; segmenta 1·25–1·5 mm. longa, ovata, subacuta, apice dense barbata. *Antherae* in perianthii tubo inclusae, circiter 0·5 longae, basi in tubo pilorum annulo instructae. *Stylus* robustus, 0·25–0·5 mm. longus, ad antherarum bases attingens. *Fructus* ellipsoideus, perianthio persistente incluso 5 mm. longus, prominenter 10-costatus, subglaucus, inter costas transverse verrucosus.

Calvinia Div.; Nieuwoudtville, *Leipoldt in Herb. Bolus.* 9377! Little Namaqualand; in hills near Brakdam, 600 m., Sept., *Schlechter* 11,138!

In this species the perianth is markedly urceolate and the anthers with the ring of golden-brown hairs are inserted well within the perianth tube (*see* fig. 16).

T. utile, *A. W. Hill*; species ramis erectis, inflorescentiis laxe paniculatis, perianthii segmentis barbatis a speciebus alteris distinguenda.

Caules pauci e rhizomate lignoso gracile erecto orti, prominenter costati et sulcati, glabri; rami ascendentes. *Folia* linearia-acicularia, acuta vel subacuta, circiter 2 cm. longa, 0·6-1 mm. lata, infra costa carinata satis conspicua instructa, glabra. *Flores* in bractearum axillis solitarii vel 3-nati, ad pedunculi brevis apicem siti. *Bracteae* floribus breviores, lineares, subacutae, glabrae, integrae; bracteae bracteis dimidio breviores, eis similes. *Perianthium* circiter 2–3 mm. longum; segmenta elliptico-lanceolata vel lanceolata, obtusa, 1·5–2 mm. longa, apice cucullata et barbata, marginibus papillosis. *Antherae* e perianthii tubo exsertae, 0·5 mm. longae. *Stylus* 0·75–1·5 mm. longus, fere ad antherarum apices attingens. *Fructus* ellipsoideo-ovoideus, 6 mm. longus, prominenter 10-11 costatus, inter costas leviter reticulatus.

Transvaal; near Pretoria, *Rehmann* 4012! 4543! 4718! hills around Pretoria, Nov., *Leendertz* 293! in fields near Heidelburg, Oct., *Schlechter* 3532! Jeppe's Town Ridge, Johannesburg, 1750 m., Feb., *Mrs. de Jongh in Herb. Galpin* 1471! Oct., *Gillan in Herb. Galpin* 6069! Rustenburg district, near Modderfontein, 1200 m., Jan., *Nation* 69! 70! Middleburg district, at Bronkhorstrymust, Dec., *Wilms* 1309! Cape Div.; Table mountain *Schlechter* 485! possibly introduced.

Miss Olive Nation states that this plant is used by the Kaffirs to make brooms.

II.—DIAGNOSES AFRICANAE: LXII.

1531. **Soyauxia floribunda,** *Hutchinson* [Passifloraceae Passifloreae]; affinis *S. lasiflorae*, Gilg, sed ramulis glabris vel glabrescentibus, foliis sensim acuminatis, venis minus conspicuis, stipulis angustioribus, floribus breviter pedicellatis differt.

Arbor altitudine mediocris; ramuli floriferi subteretes vel leviter compressi, circiter 5 mm. crassi, in sicco nigri, glabri vel minutissime puberuli; internodii 2–3 cm. longi. *Folia* oblongo-elliptica, sensim subacute acuminata, basi obtusa vel rotundata, 12–17 cm. longa, 3·5–6 cm. lata, integra, chartacea, utrinque glabra; costa infra prominens; nervi laterales utrinque 15–16, a costa sub angulo 60° abeuntes, utrinque conspicui, intra marginem recurvatum arcuati; venae infra distinctae; petioli 3·5–5 mm. longi, lateraliter compressi, circiter 2 mm. crassi, supra concavi, rugosi; stipulae lineares, apice triangulari-subacutae, 8 mm. longae, 1 mm. latae, subcoriaceae, glabrae. *Racemi* axillares subsimplices vel parce ramosi, terminales ramosissimi, usque ad 15 cm. longi; axes obtuse angulati vel compressi, circiter 1·5 mm. crassi, puberuli; bracteae minutissimae, deciduae; pedicelli vix 1 mm. longi, appresse tomentelli. *Flores* laxe dispositi, in alabastro depresso-globosi. *Sepala* late ovata, apice obtusissima, 4 mm. longa et lata, chartacea, extra inferne parce puberula, intra glabra. *Petala* ovato-oblonga, obtusa, sepalis aequalia vel paullo longiora, glabra. *Stamina* numerosissima; filamenta 1 cm. longa, glabra; antherae 0·5 mm. longae. *Styli* 3, liberi, 5 mm. longi, glabri, disco cupulari 0·5 mm. alto glabro circumdati.

Tropical Africa. Sierra Leone: Bunjema, June, *Aylmer* 86. Gambia? *Garret*.

1532. **Tricalysia reflexa,** *Hutchinson* [Rubiaceae-Gardenieae]; species corollae lobis 4 reflexis ore densissime villoso valde distincta.

Frutex vel arbor parva; ramuli virides, teretes, circiter 2 mm. crassi, inconspicue longitudinaliter sulcati. *Folia* oblonga vel oblongo-lanceolata, obtuse acuminata, basi breviter cuneata, 15–16 cm. longa, 4–6·5 cm. lata, chartacea, pallide viridia, glabra; nervi laterales utrinque 5–6, arcuati, intra marginem elongati et reticulati, utrinque conspicui; venae a costa media patulae, utrinque prominentes; petioli 0·6–1 cm. longi, 2·5 mm. crassi, glabri; stipulae late semiorbiculares, caudato-acuminatae, 5–6 mm. longae, 5 mm. latae, crasse coriaceae, glabrae. *Flores* in foliorum axillis fasciculati, pedicellati; pedicelli 2–3 mm. longi, glabri; bracteae coriaceae, brunneae, extra parce puberulae. *Receptaculum* glabrum. *Calycis lobi* patentes vel reflexi, subulato-lanceolati, acuti, 1 mm. longi, glabri. *Corollae tubus* inferne cylindricus, superne leviter ampliatus, 1 cm. longus, medio 1–5 mm. diametro, extra et intra inferne glaber, ore densissime villoso; lobi 4, valde reflexi, lanceolati, acute acuminati, 5 mm. longi, subglabri. *Antherae* exsertae, reflexae, 5 mm. longae; filamenta 2 mm. longa. *Stylus* longe exsertus, bilobus, lobis 1·5 mm. longis divergentibus parce puberulis.

Tropical Africa. Sierra Leone: Kossowe, Apr., *Lane-Poole*

1533. **Lightfootia cartilaginea,** *Scott* [Campanulaceae—Campanuleae]; habitu ad *Wahlenbergiam* proxime accedit, W. *procumbenti,* DC. similis, sed corolla alte 5 fida foliisque alternis differt; ob corollam fere ad basin divisam ad *Lightfootiam* pertinet.

Caulis adscendens, basi lignosus, copiose ramosus, 13-20 cm. longus, plus minusve striatus, hirsuto-pubescens. *Folia* alterna, numerosa, sessilia, lanceolata, apice acuta, basi subcordata, 0·8–1 cm. longa, 3–5 mm. lata, subrigida, margine sinuata et cartilaginea, integra vel dentibus parvis paucis instructa, nervis lateralibus obscuris, pagina superiore glabra, inferiore in costa pilis paucis subrigidis instructa. *Flores* terminales, magni, pedicellis erectis 5-8 mm. longis pubescentibus suffulti. *Receptaculum* pubescens. *Calycis* segmenta lanceolata, 4-5 mm. longa, viridia, glabra, margine cartilaginea, persistentia. *Corolla* coerulea, fere ad basin partita, segmentis lanceolatis vel subspatulatis 9 mm. longis 2·5 mm. latis. *Stamina* a corolla libera, fere 3 mm. alta; filamenta basi dilatata, breviter pilosa; antherae liberae, parvae, filiformes, sinuatae, 1·5 mm. longae. *Stylus* erectus, glaber vel basi apiceque tomentellus, 4·5 mm. longus, stigmate 3-fido recurvo tomentoso. *Capsula* sub-inferior, apice conica, 4 mm. diametro, calycis lobis persistentibus coronata.

Tropical Africa. British East Africa: grass land of North-West Kenya plains, 2000-2500 m., *Battiscombe* 735.

1534. **Lightfootia graminicola,** *Scott* [Campanulaceae—Campanuleae]; a *L. cartilaginea,* Scott, floribus minoribus nunquam singularibus facile distinguenda.

Caules multi a rhizomate lignoso adscendentes, basi lignosi, ramosi, 15 20 cm. longi, striati, sparse hirsuti. *Folia* alterna, lanceolata, apice subacuta, basi cordata auriculis saepe caulem amplectentibus, 1·1 1·5 cm. longa, 3-4 mm. lata, subrigida, margine crenulata et cartilaginea, dentibus paucis parvis cartilagineis instructa, nervis lateralibus utrinque obscuris, pagina superiore glabra, inferiore glabra nisi costa pilis paucis subrigidis instructa, sessilia. *Inflorescentia* spiciformis, 5–8 cm. longa. *Flores* axillares, 1 2 in axilla quoque, subsessiles vel pedicellis 1-3 mm. longis suffulti. *Receptaculum* conicum, 1·5 mm. altum, hirsutum. *Calycis* segmenta lanceolata, 2 mm. longa, margine cartilaginea, dorso ad costam pilis paucis instructa, persistentia. *Corolla* fere ad basin partita, segmentis lineari-lanceolatis 6 6·5 mm. longis 1 mm. latis dorso ad costam pilis paucis instructis. *Stamina* a corolla libera; filamenta basi late alata. *Stylus* erectus, basi levissime dilatatus, apice cylindricus, carnosus; stigma late trilobum, albo-coeruleum, tomentellum.

Tropical Africa. South-West Africa: South Angola, Humpata, 1800 m., *Pearson* 2776.

1535. **Sideroxylon Aylmeri,** *Scott* [Sapotaceae]; floribus compluribus ramulorum juniorum apicibus et nodis foliatis fasciculatis facile distinguendum.

Arbor magna, laticifera, glabra, dichotome ramosa, ramorum

cortice cinereo-fusco. *Folia* apicibus nodisque ramulorum plus minusve 2–4 conferta, petiolata, obovato-lanceolata vel elliptico-oblanceolata, basi subcuneata, apice obtuse acuminata acumine 5-8 mm. longo 3–4 mm. lato, 8–15·5 cm. longa, 3–5 cm. lata, integra, coriacea, glaberrima, costa crassa lignosa in pagina utraque distincta et elevata, nervis lateralibus supra subobscuris sed levissime elevatis infra distinctis elevatis e costa sub angulo 75° abeuntibus intra marginem 7–9 mm. divaricatis et anastomosantibus; petioli 1·75–2 cm. longi. *Flores* nodis foliatis fasciculati, numerosi e nodo utroque 50–80, pedicellati pedicellis 1·4–1·5 cm. longis pubescentibus. *Calycis* segmenta imbricata, ovata, subacuta, sub anthesi 3·5–4 mm. longa, 2·5–3 mm. lata, coriacea, fusca, pubescentia. *Corollae* segmenta tenuissima, albida, triangulari-ovata, acuta, circiter 2·5 mm. longa, glabra. *Staminum* filamenta brevia, alabastro 0·5 mm., sub anthesi 1–1·5 mm. longa; antherae magnae, triangulares, mucronatae, 2·25–2·5 mm. longae, 0·5–0·75 mm. latae, extrorsum dehiscentes. *Staminodia* scariosa, petaloidea, ovata, acuta, 2–2·5 mm. longa, 1–1·5 mm. lata, integra vel margine levissime lacerata et parce pilosa. *Ovarium* 5-loculare, hirsutum; stylus crassus, 3–4 mm. longus sed sub anthesi plus minusve elongatus; stigma minutum, integrum. *Fructus* magnus, 7–8 cm. diametro. *Semina* oblique et anguste ellipsoidea, 3·5 cm. longa, 1·5 cm. lata, testa crustacea nitida brunnea hilo infra apicem paullum excavato basi sulcato fere ad basin extenso instructa.

Tropical Africa. Sierra Leone: Falaba, April, *Aylmer* 57; May, *Lane Poole* 235.

1536. **Baissea Lane-Poolei**, *Stapf* [Apocynaceae-Echitidei]: affinis *B. leonensi*, Benth., sed facile corolla late infundibulari-campanulata latiloba distinguenda.

Frutex alte scandens, trunco basi ad 30 cm. diametro: ramuli viridi-fuscescentes, tenuissime puberuli. *Folia* obovata vel oblongo-obovata, basi acuta, apice subito in acumen breve obtusiusculum vel obtusum 0·4–1 cm. longum producta, 6·5–8 cm. longa, 3·5–4·5 cm. lata, tenuiter coriacea, glaberrima nisi in nervorum axillis acarodomitiis rufo-pubescentibus munita, pallide viridia, nervis lateralibus utrinque 4–5 tenuibus prominulis, venis laxiusculis e costa angulo subrecto emissis; petioli graciles, 1–1·2 cm. longi. *Paniculae* axillares, ad cymas 2–6-floras reductae et terminales ad 3 cm. longae, pluriflorae, tenuiter fusco-puberulae; pedunculi graciles, 1–1·8 cm. longi; bracteae minutae, ovatae, subacutae; pedicelli 3–5 mm. longi. *Calyx* late cupularis, 2 mm. longus; sepala late ovata, obtusa, praeter margines minute fusco-puberula. *Corolla* albida (?), infundibulari-campanulata, 8 mm. longa, substantia crassiuscula; tubus 3–3·5 mm. longus, latus, extra densissime minute fusco-tomentellus, intra praeter pilorum reversorum fascilos inter callos positos et pubem infra callos ad staminum bases decurrentem glaber, callis transversis distinctis; lobi ovato-oblongi, obtusi, 4–4·5 mm. longi, obtusi. *Staminum* conus corollae os attingens; antherae 3 mm. longae, dorso glabrae. *Discus* distinctus, 5-crenatus. *Carpella* dense tomentosa.

Tropical Africa. Sierra Leone: York Pass, *Lane-Poole* 322.

1537. **Pleiocarpa tricarpellata,** *Stapf* [Apocynaceae-Plumerioideae]; affinis *P. muticae;* Benth. et *P. salicifoliae*, Stapf, ab utraque differt foliis anguste oblongis laxius nervosis, ab illa praeterea carpellis 3–nis (haud 5–nis) 2–ovulatis, ab hac floribus longioribus.

Frutex glaberrimus, ramulis fuscis quadrangulis, lenticellis parcis majusculis. *Folia* oblonga, basi breviter acute attenuata, apice in acumen 0·8–1·8 cm. longum obtusum producta, 15–18 cm. longa, 4–5·5 cm. lata, tenuiter coriacea, utrinque nitidula, nervis lateralibus utrinque 9–11 tenuibus, venis tenuissimis; petioli 6–7 mm. longi. *Flores* in glomerulos resina indutos 5–6-floros axillares congesti. *Calyx* 2 mm. longus; sepala ovato-oblonga, obtusa. *Corollae* tubus 1·5–2·2 cm. longus; lobi oblongi, obtusi, 7–8 mm. longi. *Carpella* 3, ovulis 2-nis.

Tropical Africa. Sierra Leone: Falaba, *G. Aylmer*. 35 (comm. *C. E. Lane-Poole*).

1538. **Vitex keniensis,** *Turrill* [Verbenaceae-Viticeae]: *V. milanjiensi*, Britten, affinis sed foliolis oblongo-ellipticis basi rotundatis vel subacutis haud cuneatis longius petiolulatis chartaceis differt.

Arbor usque ad 24–27 m. alta (ex *Hb. Battiscombe*). *Folia* quinquefoliolata, petiolo incluso usque ad 3·3 dm. longa, 2·8 dm. lata, petiolo usque ad 13·5 cm. longo terete vel leviter compresso ferrugineo-pubescente vel tomentoso suffulta; foliola oblongo-elliptica, apice breviter acuminata, basi rotundata vel subacuta, saepissime leviter obliqua pagina superiore pubescente praecipue in costa nervisque leviter impressis inconspicue transverse venosa, pagina inferiore ad costam nervosque prominenes ferrugineo-pubescente vel fere tomentosa caeterum pubescente, nervis lateralibus marginem versus anastomosantibus; foliolum terminale 16–17 cm. longum, 8·5 cm. latum, nervis lateralibus utrinque circiter 16, petiolulo 4 cm. longo adjecto; foliola lateralia 15 cm. longa, 8·5 cm. lata, nervis lateralibus utrinque circiter 15, petiolulo 3–3·25 cm. longo suffulta: basalia 10·5 cm. longa, 6–6·5 cm. lata, petiolulo 1·5–1·75 cm. longo; petioluli ferrugineo-tomentosi. *Inflorescentia* terminalis (vel interdum axillaris ?), pedunculo usque ad 13 cm. longo excluso 14 cm. longa, 24 cm. lata, laxe dichotome ramosa, ramis ferrugineo-pubescentibus vel -tomentosis; bracteae 0·5–1 mm. longae, 1–4 mm. latae, subtus dense ferrugineo-tomentosae, supra glabrae. *Flores* extra ferrugineo-tomentosi, pedicello 1 mm. longo suffulti. *Calyx* sub anthesin campanulatus, 4 mm. longus, 4 mm. latus, fere truncatus, dentibus 5 late triangularibus 0·5 mm. longis 1·5 mm. latis inconspicuis instructus; infructescens late campanulatus, usque ad 1 cm. longus et 1·1 cm. latus. *Corollae* tubus late cylindricus, superne gradatim ampliatus, 5 mm. longus, basi 2·5 mm. diametro, fauce 4 mm. diametro; limbus quinquelobatus, lobo antico late orbiculari 3 mm. longo 3·5 mm. lato, lobis lateralibus oblongis 3 mm. longis 2 mm. latis, anticis oblongo-ovatis 2·5 mm. longis 2 mm. latis. *Stamina* 4, cum stylo leviter exserta, antheris 0·75 mm. longis; duo antica filamentis 4 mm. longis inferne dilatatis barbatis: duo postica filamentis 3 mm. longis basi

barbatis. *Ovarium* sphaericum, 1·75 mm. diametro, apice barbatum; stylus 6 mm. longus, apice bifidus, glaber. *Fructus* pyriformis 1·1 cm. altus, 8 mm. diametro, glaber.

Tropical Africa. British East Africa; Mt. Kenia, 1500 1800 m., *D. K S. Grant* (ex *Hb. Battiscombe*) 846.

This is one of the most important timber trees of North-East and Eastern Kenia, where it attains a height of 80–90 feet. The timber is light, easily worked and of a good appearance, the grain much resembling teak. The native (Meru) name is Moru or Muhuru.

The species is especially distinguished by its oblong-elliptic leaflets which have comparatively long petiolules, the ferrugineous tomentum which appears on most parts of the plant, and the large dichotomously branched inflorescences. From the dried material at present received it seems that at least some inflorescences are terminal, but it is possible that axillary ones are also produced. The persistence and enlargement of the calyx characteristic of the genus is particularly noticeable in this plant owing to the somewhat isolated position of the fruits with the enlarged calyces in the forks of the inflorescence produced by the dichotomous nature of the branching.

1539. **Phyllanthus flacourtioides,** *Hutchinson* [Euphorbiaceae-Phyllantheae]; affinis *P. discoideo*, Muell. Arg., sed disco in floribus ♂ glandulis liberis constituto differt.

Rami teretes, glabri; ramuli juniores glabri, sicco nigrescentes. *Folia* elliptica vel oblongo-elliptica, utrinque plus minusve rotundata, 0·8–5 cm. longa, 0·6–2·5 cm. lata, integra, tenuiter chartacea, glabra; nervi laterales utrinque circiter 6, arcuati, graciles, distincti; veni infra laxe anastomosantes; petioli circiter 4 mm. longi, glabri; stipulae lineari-lanceolatae, acutae, satis membranaceae, circiter 4 mm. longae, glabrae, costa distincta et marginibus subhyalinis. *Flores* ut videtur dioici; ♂ ad ramulorum apices fasciculati; pedicelli 3 mm. longi, ad apicem leviter incrassati, glabri. *Sepala* 4, obovata, apice rotundata, 1·5 mm. longa, 1·25 mm. lata, glabra. *Disci glandulae* parvae, tenues, rotundatae, laeves. *Stamina* 4; filamenta libera, antheris circiter dimidio breviores; antherae ellipsoideae, 1 mm. longae, lateraliter dehiscentes. *Flores* ♀ ramulorum juniorum basin versus subsolitarii; pedicelli fructiferi 9 mm. longi, glabri. *Sepala* 4, late ovata, obtusa, 2·5 mm. longa, 2 mm. lata, submembranacea, glabra. *Discus* annularis, parvus. *Fructus* immaturus trilobatus, glaber. *Styli* inferne connati, parte libera abrupte recurvata et fere ad basin bilobata.

South Africa. Delagoa Bay: Lorenzo Marques, 45 m., *Schlechter* 11,598; 11,634.

1540. **Torulinium angolense,** *Turrill* [Cyperaceae-Scirpeae]: *T. Vahlii*, C. B. Clarke, affine sed spiculis latioribus, glumis acuminatis facile distinguendum.

Herba perennis, glabra, erecta, usque ad 9 dm. alta, dense caespitosa, caulibus acute triquetris basi tuberosis foliorum vaginis plus minusve fibrosis dense obtectis. *Folia* omnia

manca, linearia, saltem 2·3 dm. longa, 5 mm. lata, margine leviter serrata, vaginis laevibus purpureis. *Inflorescentia* terminalis, composita, umbellata, umbellis radiis usque ad 8 cm. longis instructis vel sessilibus, umbellis secundariis paucі- vel multi-spiculatis; spiculae circiter 10–12-florae, 6 mm. longae, 3 mm. latae; bracteae foliis similes, usque ad 8 mm. latae. *Glumae* late ovatae, 2·25 mm. longae, 2 mm. latae, acuminatae, margine leviter ciliatae, distincte nervatae, costa superne leviter serrata. *Stamina* 3, filamentis 2 mm. longis. *Ovarium* obovato-ellipticum; stylus ramis tribus 1·5 mm. longis inclusis 2 mm. longus. *Nux* ambitu obovato-elliptica, acute triquetra, 1·5 mm. longa, 1 mm. diametro, intense castaneo-brunnea vel fere nigra.

Tropical Africa. Angola; Benguella, country of the Ganguellas and Ambuellas. *Gossweiler* 2989.

The spikelets bear a general resemblance to those of *Cyperus aristatus*, Rottb., though the glumes are not so acuminate. The chief difference between *Torulinium* and *Cyperus* is that in the former genus the rhachis ultimately breaks up into as many portions as there are glumes and nuts, while in the latter the rhachis is persistent, the glumes and nuts falling off separately.

III.—MISCELLANEOUS NOTES.

Additions and alterations to Gardens, 1914.—Additions to the collections of plants cultivated at the Royal Botanic Gardens, Kew, have been made during the year by exchanges with other gardens, private as well as public, and by purchase from nurserymen and others. Naturally, the international character of the exchanges suffered to some extent during the concluding months of the year. Contributions of plants and seeds received from Botanic Gardens and other institutions include the following:—

Belem, Municipio de.—Palms from the International Rubber Exhibition.

Brisbane.—Wardian case of filmy ferns.

British East Africa.—Native seeds.

Brussels Colonial Garden.—Rubber and Fibre plants from International Rubber Exhibition; plants of *Agave tequilana*.

Calcutta.—Orchids; Himalayan seeds.

Christchurch, N.Z.—Collection of native seeds.

Dunedin.—Filmy ferns; tubers of *Convolvulus chrysorhizus*; collection of native seeds.

Hong Kong.—Wardian case of plants.

Jamaica.—Large consignment of filmy ferns; succulent plants; seeds.

Königsberg.—Bromeliads.

Koshun.—Various seeds.

Missouri.—Succulent plants.

New South Wales.—Plants of *Telopea speciosissima*.

New Zealand Government.—Collection of *Phormium tenax* vars.

St. Lucia.—*Ionopsis utricularioides*.

South Africa, National Botanic Garden.—Various seeds.

Southern Nigeria.—Oil palms from International Rubber Exhibition; *Dioscorea* tubers.
Singapore.—Two Wardian cases of plants.
Sydney.—Collection of seeds.
Tiflis.—Various seeds.
Trinidad.—Filmy ferns; orchids.
United States Department of Agriculture.—Succulent plants; seeds.
Victoria, Kamerun.—Native seeds.
Zanzibar.—*Amorphophallus* and *Gonatopus* tubers.

Exchanges were made with the Botanic Gardens of Cambridge, Oxford, Edinburgh, Glasgow, and Glasnevin, and with most of the European gardens upon which Kew is largely dependent for seeds of those annual herbaceous plants which fail to produce seeds at Kew.

Other donations to the Gardens include the following:—

Mr. J. F. G. Bannatyne, Haldon House, near Exeter.—Large plant of *Davallia Mooreana*.
Bees, Ltd., Liverpool.—Collections of Chinese seeds.
Dr. L. Cockayne, New Zealand.—Filmy ferns.
Mr. M. T. Dawe, Okehampton.—Brazilian plants and seeds.
Mr. J. Gossweiler, Angola.—Plants and seeds.
Mr. A. Hislop, Rhodesia.—Plants and seeds.
Mr. R. Hoffmann, Streatham.—Caladiums.
Messrs. C. B. Kloss and H. C. Robinson, Federated Malay States.—Sumatran seeds.
Lady Lawrence, Burford.—Collection of botanical orchids. (See *Kew Bull.*, 914, p. 172.)
Mozambique Company.—Seeds of *Balanites* new spp.
Dr. G. V. Perez, Teneriffe.—Seeds of Canary Island plants.
Mr. H. Perrier de la Bâthie, Madagascar.—Germinating seeds of *Uapaca clusiacea*.
Mrs. Robinson, South Kensington.—Four orange trees.
Messrs. Sander and Sons, St. Albans and Bruges.—New plants: orchids and others.
Mr. G. Thorncroft, Barberton.—South African seeds.
Mr. J. C. Williams, Caerhays.—Chinese seeds collected by Mr. G. Forrest; plants.
Messrs. J. Veitch and Sons, Ltd., Chelsea.—Winter-flowering begonias and other plants.
Mr. J. Burtt-Davy, Transvaal; Major Light, India; Mrs. Nevill, Norwich; and Mr. E. Seimund, Federated Malay States.—Orchids.

Among the plants and seeds of interest distributed from Kew during the year were the following:—*Acacia spectabilis* (seeds). *Agave tequilana*, *Balanites Dawei* and *B. Maughamii* (seeds). seeds of Canary Island plants received from Dr. G. V. Perez. Cauto cotton (seeds received from Jamaica). Chinese trees and shrubs of recent introduction, *Convolvulus chrysorhizus* (tubers). varieties of *Phormium tenax*, West African 'Yams,' seeds of *Quercus Ilex* in quantity to Colonial Forestry Department, and *Zizyphus vulgaris* vars. (seeds), surplus aquatics and young palms.

The distribution of plants to Colonial and Indian gardens was as usual.

Surplus trees, shrubs and herbaceous plants were presented to public institutions, notably to the Royal Parks, London, Kew Observatory, Magdalen College, Oxford, and the new Cattle-testing Station of the Board of Agriculture.

There was a large demand for seeds ripened at Kew and offered for distribution in *Bulletin*, Appendix 1, 1914.

A further portion of the Rock Garden was reconstructed with weathered mountain limestone obtained from the Cheddar district.

The filmy fern collection was rearranged and strengthened with the assistance of correspondents in the Colonies, among whom we are particularly indebted to The Hon. H. H. Cousins, Director of Agriculture, and to Mr. Harris, Superintendent of Public Gardens, Jamaica, for the magnificent cases of Jamaican Filmy ferns. The ferns were in many instances sent attached to the stems, etc., on which they were growing, and arrived at Kew almost as fresh as when they were collected. A fine collection was also received from Dr. L. Cockayne, New Zealand, which reached Kew in excellent condition; and the Assistant Director of the Botanic Gardens, Trinidad, sent an interesting and representative collection of Filmy ferns from that island.

The collection was further augmented by the purchase of a number of specimens from Dr. Winter, of Brighton.

Work in the Grounds.—The depletion of the staff owing to the war has necessitated the postponement of any extensive works of alteration or improvement in the grounds for this winter. One arduous task that has had to be deferred on this account is the cleaning out of the Lake. In October, however, the vegetation on the four islands was overhauled and considerably thinned. Owing to the abundant moisture their roots enjoy, the trees on these islands grow very luxuriantly, and on each island the vegetation had become consolidated into a heavy solid-looking mass.

The completion of the new Refreshment Pavilion last autumn has occasioned a considerable work of renovation. A large area of lawn adjoining the Pagoda Vista was taken over for the erection of a refreshment tent and temporary buildings. This has had to be levelled and relaid with turves carted from other parts of the grounds; new gas and water pipes have had to be put down; and a gravelled area round the Pavilion 4 to 8 yards wide has been made, as well as a service path from it to the adjoining entrance gate in Kew Road.

On the narrow strip of ground between the wall abutting on Kew Road and the walk that runs almost parallel with it from the Victoria Gate to the Lion Gate, a considerable amount of mixed deciduous vegetation has been replaced by evergreen trees and shrubs. This has been done with the object of forming a dense screen shutting out from view all the year round, as much as possible, the omnibuses, road-engines and other features of a busy suburban thoroughfare that at present disturb the amenities of this charming and popular walk.

The Arboretum Collections.—One of the most troublesome

problems of this and recent planting seasons has been the provision of space for the enormous number of new hardy trees and shrubs, chiefly from China, that have been added to the Kew collections. In putting out these plants in permanent places, two important matters have to be kept in view. One is that these new species should be placed in contiguity to others of the same genus, so that visitors may be enabled to find reasonably quickly, by means of the published guide, the tree or shrub they desire to study or compare. The other consideration is that the landscape beauties of Kew, which it has been the aim of successive Directors to maintain and develop, should not be affected. There is scarcely anything more calculated to detract from the dignity of a demesne like that of Kew, with its fine old trees and spacious vistas and lawns, than the promiscuous planting of a large number of small trees just out from nursery quarters.

The general lines of the Kew Arboretum were laid down by Sir Joseph Hooker about forty years ago, at a time when the present enormous accretions of material could not have been foreseen. The spaces originally allotted to certain genera and families have consequently proved quite inadequate. In some instances it has been necessary to move an entire genus or even Natural Order to a new site so that the development of a neighbouring one may be provided for. This involves much labour, and for it to be done without incurring serious or perhaps irreplacable losses very careful transplanting is necessary.

Hybridising Trees.—In association with Prof. A. Henry, of the Royal College of Science, Dublin, some experiments in the hybridisation of timber-producing trees have been carried out. The extraordinary vigour of some hybrid trees such as *Salix coerulea*, *S. Salamoni*, *Populus serotina* and *P. Eugenei*, various elms, etc., without counting more doubtful instances like the London plane and common lime, led Prof. Henry to attempt the production of others of equal or perhaps greater value, whose origin (unlike most or all of those mentioned) would be known and recorded. The experiments were carried out on larches, poplars, ashes, alders, oaks and walnuts, and the isolation of the flowers, their cross-fertilising, as well as the protection and gathering of the seeds, was done by members of the Kew staff. Seeds were developed on two larches, seven poplars, nine ashes, one alder, two oaks and one walnut. Of these, all the poplars and oaks as well as four ashes have already germinated.

Storms at Kew.—On four occasions during 1914 Kew suffered by storms. The most serious loss occurred on March 16th, when the large and famous old tulip tree at the north end of the Rhododendron Dell was blown down. (See *K. B.* 1914, p. 173.) In May, and again in June, Kew was visited by thunderstorms. On each occasion, curiously enough, a tall Atlas cedar was struck by lightning. Probably the most violent wind-storm of the year occurred on December 28th between 8 and 10 p.m. As in March, the ground had been softened by heavy and persistent rain (totalling over 6 inches during December) and some eight or

nine trees of goodly size were blown down. One was the largest common ash Kew possessed, which stood on the eastern side of the Rhododendron Dell. A very healthy and handsome specimen of *Pinus Sabiniana* near the Isleworth Ferry Gate went down. This pine—the 'Digger' pine of N.W. America—is no longer very common in cultivation. A tall beech in the wood S.W. of the Azalea Garden also fell. Seeing the considerable age of most of the beeches in Kew, and the fact that many show evidences of having reached their period of decadence, the loss of but one of them may be regarded as a fortunate escape in a storm of such extraordinary violence as this. Nothing else of particular value was lost, although the destruction of one of the middle-sized elms on the river side of Queen Elizabeth's Lawn makes a noticeable gap in the row there.

Additions to Arboretum.—The final sales by auction of the collections in the Coombe Wood Nursery of Messrs. Veitch enabled Kew to obtain a few of the large specimens of rare trees and shrubs growing there. The fine *Trochodendron aralioides* that had so long been an interesting feature at Coombe Wood is now established near the Sun Temple at Kew. It is 10 feet or so high and is the oldest, perhaps the largest, example of this remarkable Japanese tree in the country. It flowered profusely in its new quarters last April and May, and its flowers, although green, are very striking, and attracted much attention from visitors. The only plant of *Sassafras Tzumu* ever raised from seed in this country was presented by Messrs. Veitch. This tree is of remarkable interest as the Asiatic representative of the Sassafras of North America—each being the sole example of its genus on the respective continents. The Coombe Wood tree had made enormously thick roots without fibre and has felt its removal so severely that it may not recover, although it is being nursed under glass. Two young plants raised from it are, however, quite healthy. A good plant of the new *Diospyros armata*, an ally of the Persimmon and kaki, was purchased, and is planted near No. II. Fernery. Excellent specimens of the Southern beeches, *Nothofagus fusca* and *N. cliffortioides*, each 12 to 15 feet high, were bought, also the rare *Pterocarya hupehensis*, *Rosa omeiensis* and *Schizandra Henryi*.

Rare Chinese shrubs have also been presented by Mr. J. C. Williams, Mr. Maurice L. de Vilmorin, Miss E. Willmott, Mr. P. D. Williams, Mr. Gerald Loder and Mr. F. R. S. Balfour. Mr. Balfour has also presented some new and interesting species from North-west America. Mr. A. Waterer gave some new varieties of garden rhododendrons raised at Knap Hill, the home of so many famous hybrids. Mr. Elwes, from his garden at Colesborne, has contributed a number of trees which possess a certain historical interest in being derived from notable trees or sites—such as a beech raised from the famous one at Newbattle, a Lucombe oak from the Killerton tree, an Oriental plane from the Temple of Diana, at Ephesus, etc.

Cupressus formosensis.—Seeds of this remarkable cypress were presented by Mr. H. Clinton-Baker in 1911. They germinated well, and about two dozen plants were raised which have

lately been planted in the Southern Pinetum and elsewhere. Examples of this cypress have been found in Formosa upwards of seventy feet in girth of trunk. It is, therefore, one of the giant trees of the globe, and the most gigantic conifer of the Old World—worthy to be compared with the mammoth trees of California. It is evidently most closely allied to the Japanese *C. pisifera*, having the same sharply-pointed leaves, but without the white stomatic patches beneath seen in that species. The young trees are very healthy and vigorous, and assuming that they will prove hardy, it is very satisfactory to have got so interesting a tree well established in our collections.

The following trees and shrubs have flowered in the Arboretum Department for the first time:—

Acanthopanax leucorrhizum.
,, scaberulum.
Alnus cremastogyne.
Berberis levis.
Betula alnoides pyrifolia.
Callicarpa sp. (? Giraldiana) (fruit very handsome).
Clematis brachyura.
,, glauca var. akebioides.
Corylopsis platypetala.
,, ,, var. laevis.
,, sinensis.
,, Willmottiae.
Evodia hupehensis.
Pyrus kansuensis.
,, scalaris.
,, yunnanensis.
Rhododendron Davidsonianum.
,, Fargesii.
,, Hanceanum.
,, longistylum.
,, moupinense.
,, villosum.
,, yanthinum.
Vaccinium neglectum.
Viburnum betulifolium (fruit brilliant red).

Waterfowl.—The past season was on the whole a highly successful one, and though the number of birds reared was not so large as in the previous year it included several birds not bred before at Kew.

Among the birds reared were Carolinas; Mandarins; Common, Red-crested, and White-eyed Pochards and Tufted Ducks; Common Sheldrake; Brazilian, Common and Chilian Teal; Bar-headed, White-fronted, Canadian and other geese and a black-necked Swan.

The Storks were again disturbed this year and failed to hatch out their eggs, and one of the pair of black-necked swans was killed when about a fortnight old by a visitor, who threw a stone at it, apparently to try and make it leave its mother's back. The Badger was again active among the geese by the lake during the

breeding season, and was in consequence deported. When digging him out it was of interest to find his earth carpeted with masses of blue-bell leaves and flowers, and also to discover the skeletal remains of some of our birds. Rats have also caused some serious losses.

Among interesting birds added to the Kew collection by presentation of exchange during the past year, may be mentioned a pair of American Widgeon from Mr. W. H. St. Quinitin, of Scampston Hall, Rillington, York; two pairs of Falcated Teal and a pair of Ringed Teal. A pair of Crowned Cranes has also been added and a pair of pale-grey Guinea-fowl presented by Mrs. Orde, of Nunnykirk, Morpeth.

Official Visits.—During the past year the vote for travelling expenses has been utilised as follows:—

The Director.—Being deputed by the Board of Agriculture and Fisheries to attend the International Phytopathological Congress which was held at Rome.

The Curator.—In visiting the Royal Botanic Gardens, Edinburgh, and horticultural establishments in Scotland.

The Assistant Curator.—In visits to gardens in Cornwall.

Mr. Sprague, Assistant in the Herbarium.—For the purpose of examining types of African plants in the Berlin Herbarium.

The Keeper of the Museums.—In a visit to Liverpool for the examination of imported tropical products, etc.

Mr. W. Dallimore, Assistant in the Museums.—In a visit to Swansea in connection with forestry exhibits at the Bath and West and Southern Counties Show.

Other visits which had been planned had to be postponed owing to the outbreak of hostilities.

Museums.—A considerable number of interesting products have been added to the collections during the past year, and these have been recorded from time to time in the *Bulletin*. Special mention must be made of the large amount of material consisting of specimens of rubber and miscellaneous tropical products obtained from the various sections of the International Rubber Exhibition held in London during the summer. These products have been dealt with and incorporated in the permanent collections.

Duplicate products have been distributed to various institutions, including the Royal College of Science, Dublin; the London County Council, for the Geffrye Museum; Art Gallery and Museum, Rochdale; Public Library and Museum, Colne, Lancashire, etc.

Many products have been received for determination and for general information as to the properties and uses and for references to the literature bearing upon the same. This is a most important work of the department, and the large number of enquiries received are evidence that the Museums have of recent years become of increasing importance to the commercial community.

The relabelling of the contents of Museum No. I. has gone on steadily during the year. In Museum No. IV. much new material has been prepared and placed in position, and an additional wall case has been provided in one of the upper rooms.

As in former years an exhibit, consisting chiefly of duplicate material, was prepared for the Bath and West and Southern Counties Show held at Swansea.

Since the outbreak of war five of the six Museum porters have rejoined the Army, with the result that the Department is somewhat handicapped and much necessary work has had to be postponed.

A new edition of the Guide to the North Gallery was produced during the year.

J. M. H.

Research in Jodrell Laboratory in 1914:—

Boodle, L. A.—On the Trifoliolate and other Leaves of the Gorse (*Ulex europaeus*, L.). (Ann. Bot., vol. 28, pp. 527–530.)

Boodle, L. A.—The Ringing of Trees. (Kew Bull., 1914, pp. 222–225.)

Bower, F. O.—Studies in the Phylogeny of the Filicales. IV. *Blechnum* and Allied Genera. (Ann. Bot., vol. 28, pp. 363–431, with eleven plates and twenty-six figs. in text.)

Massee, G.—How Saprophytic Fungi may become Parasites. (Kew Bull., 1914, pp. 190–191.)

Massee, G.—Black-Knot of Birch. (Kew Bull., 1914, pp. 322–325, with five figs. in text.)

[**Massee, G.**]—Bad Germination of Wheat Seed. (Journ. Board Agric., vol. 20, pp. 894–896, with one plate.)

[**Massee, G.**]—Diseases of Peas. (Journ. Board Agric., vol. 21, pp. 418–423, with one plate.)

Massee, Miss Ivy.—A Mildew on *Veronica hulkeana*. (Gard. Chron., 1914, I., p. 339.)

Massee, Miss Ivy.—Observations on the Life-History of *Ustilago Vaillantii*, Tul. (Journ. Econ. Biol., vol. 9, pp. 9–14, with one plate.)

Massee, Miss Ivy.—Clover and Lucerne Leaf-Spot. (Journ. Econ. Biol., vol. 9, pp. 65–67, with four figs. in text.)

Massee, Miss Ivy.—On the Presence of Hybernating Mycelium of *Macrosporium Solani* in Tomato Seed. (Kew Bull., 1914, pp. 145–146, with one plate.)

Sprague, T. A., and **Boodle, L. A.**—West Indian Boxwood (*Casearia praecox*, Griseb.). (Kew Bull., 1914, pp. 214–219.)

Thomson, R. B.—The Spur Shoot of the Pines. (Bot. Gazette, vol. 17, pp. 362–385, with four plates and two figs. in text.)

Worsdell, W. C.—The Morphology of the 'Corona' of Narcissus. (Ann. Bot., vol. 28, pp. 541–543, with three figs. in text.)

Mr. L. A. Boodle studied examples of concrescent leaves in *Pinus*, and other abnormal specimens, and examined the anatomy of several plants including West Indian Boxwood: see above.

Mr. M. Drummond was engaged in a research on the structure and function of the hydathodes of various species of plants.

Mr. E. W. Fenton made some observations on a species of *Peridermium*.

Miss E. M. Jesson examined the structure of the hairs on the leaves of certain species of *Rhododendron*, and studied the spikelet of a new genus of Grasses.

Miss I. Massee completed a research on the occurrence of the mycelium of a *Macrosporium* in Tomato seeds, and studied the life-histories of several Fungi causing diseases of plants: see above.

Dr. H. Schmidt carried out some experiments on the behaviour of aqueous solutions under conditions of capillary conduction.

Prof. G. K. Sutherland investigated the life-history of a Fungus parasitic on cabbage, and made a study of some new marine Fungi, and of certain features in the anatomy of *Spartina Townsendi*.

Mr. W. C. Worsdell studied numerous teratological specimens in relation to their morphological nature, and continued his investigations on the vascular anatomy of the Dicotyledons: see above.

Pathology.—The amount of material submitted to Kew for investigation increases in quantity year by year. This is the outcome of a clearer grasp by cultivators at large of the true causes of disease, which in past times were attributed to an angered Deity, or to the influence of 'blight.' The dry season specially favoured the development and rapid spread of mildew. *Peronospora grisea*, De Bary, a mildew common on many of our wild speedwells and allied plants, has succeeded in establishing itself on our exotic species of *Veronica*, *V. Hulkeana* being especially susceptible. Cereal-blight, caused by *Sphacrella Tulasnei*, Jans., has been very much in evidence, the ears becoming blackened by its conidial form known as *Cladosporium herbarum*, Pers. The wheat crop has suffered most. There is evidence to show that various diseases due to fungi and mites respectively are being imported along with bulbs, and the sterilisation of consignments of bulbs, even when apparently sound, is advisable. As usual, various consignments of diseased plants from British Possessions have been dealt with.

Additions to the Herbarium during 1914.—During the year about 25,500 specimens were received as donations or exchanges, and 13,500 acquired by purchase, while 4,400 were received on loan in addition to those temporarily deposited for the preparation of the 'Flora of Madras.' The principal collections are enumerated below:—

Europe.—*Presented:* Iceland, by Mr. W. B. Turrill; Orkneys, by Col. H. Halcro Johnston; Ireland, by Mr. R. Lloyd Praeger;

Russia, by the Imperial Botanic Garden of Peter the Great, Petrograd; C. Crossland, British Fungi, by the Bentham Trustees.

Purchased: H. Dahlstedt, Taraxaca Scandinavia Exsiccata, fasc. 3; Dr. A. v. Hayek, Centaureae Exsiccatae Criticae, fasc. 2; Fiori and Béguinot, Flora Italica Exsiccata, Cent. xix.-xx., and Xylotomotheca Italica; Dr. M. Gandoger, Crete; G. Woronow, Herbarium Florae Caucasicae, fasc. 2–3.

China.—*Presented:* E. H. Wilson and W. Purdom, by Messrs. Jas. Veitch and Sons; G. Forrest, by the Royal Botanic Gardens, Edinburgh.

Purchased: E. H. Wilson (per Prof. C. S. Sargent).

India.—*Presented:* Wallichian Herbarium (supplementary specimens), by the Linnean Society; India (chiefly Northern), by the Royal Botanic Gardens, Calcutta; Kashmir, by Mr. G. L. C. Fuller; Nepal (Lieut. Lal Dhoj), by Lt.-Col. J. Manners Smith: Bengal and United Provinces, by Mr. H. H. Haines; Burma, by Mr. J. H. Lace; Malay Peninsula, by Mr. H. C. Robinson and the Royal Botanic Gardens, Calcutta; Indian mosses, by Mr. L. J. Sedgwick.

Purchased: Rev. A. Saulière, Madras.

Malaya.—*Presented:* Siam, by Dr. A. F. G. Kerr, Mrs. D. J. Collins, Phra Vanpruk and Mr. H. B. G. Garrett; Philippine Islands, Mr. Oakes Ames; Java and Borneo, by the Buitenzorg Botanic Garden; Dutch New Guinea (C. Boden Kloss), by the Trustees of the British Museum.

Purchased: A. D. E. Elmer, Philippine Islands.

Australia.—*Presented:* Western Australia, by Dr. F. Stoward: Northern Australia, near Port Darwin, by Mr. C. E. F. Allen.

New Zealand.—*Presented:* By Dr. D. Petrie.

Purchased: Miss J. E. Tilden.

Polynesia.—*Purchased:* Miss J. E. Tilden, Tahiti.

Tropical Africa.—*Presented:* Sierra Leone, by Mr. N. W. Thomas, Mr. C. E. Lane-Poole and Mr. G. Aylmer; Gold Coast, by Mr. T. F. Chipp; Nigeria, Southern Provinces (C. O. Farquharson), by Mr. W. H. Johnson; Eket District (Mr. and Mrs. P. A. Talbot), by the Trustees of the British Museum; Congo Region, by Dr. E. De Wildeman; Uganda Protectorate, Entebbe, by Mr. W. R. Rutter; Victoria Nyanza, by Mr. T. D. Maitland; British East Africa, by Mr. E. Battiscombe, (Miss M. J. Johnstone) by Mr. W. J. Dowson; Percy Sladen Memorial Expedition (Prof. H. H. W. Pearson and others), by the Percy Sladen Memorial Trustees; Southern Rhodesia, by Mrs. Olive Craster; *Commiphora*, by the Königlicher Botanischer Garten. Dahlem.

Purchased: G. Zenker, Cameroons; A. Pappi (per Dr. E. Chiovanda), Eritrea; A. Stoltz, Nyasaland.

Mascarene Islands.—*Presented:* Madagascar, Central Plateau, by Messrs. H. T. Hodgkin and C. E. Stansfield.

South Africa.—*Presented:* Transvaal (A. O. D. Mogg), by I. B. Pole Evans.
Purchased: H. Rudatis, Natal.

North America.—*Presented:* Arkansas (E. J. Palmer), by Prof. C. S. Sargent; California, by Miss Alice Eastwood; grasses, by the U.S. Department of Agriculture.
Purchased: A. H. Brinkman, British Columbia; N. C. Kindberg (per Major Axel Kindberg), mosses; A. A. Heller, Nevada and California; P. B. Kennedy, Nevada.

Central America.—*Presented:* Mexican *Coniferae* (G. R. Shaw), by Prof. C. S. Sargent.

West Indies.—*Presented:* Cuba, etc., by the New York Botanical Garden; Dutch West Indies, by the Herbarium van de Rijks-Universiteit te Utrecht; marine *Algae*, by Dr. Marshall A. Howe.

South America.—Uruguay, by Mr. Mariano B. Berro.
Purchased: E. Ule, Brazil; Dr. Th. Herzog, Bolivia and Chili.

General.—*Presented:* miscellaneous plants, by the Directeur de la Galerie de Botanique du Muséum Nationale d'Histoire Naturelle, Paris; *Polyporaceae*, by Mr. C. G. Lloyd.
Purchased: H. Sudre, Herbarium Hieraciorum, fasc. 2–4: H. Sydow, Fungi Exotici Exsiccati, Fasc. 5–6.

A valuable collection of over 2200 specimens has been received from the Paris Herbarium, and contains many species from New Caledonia, Indo-China and Africa. Mr. C. G. Lloyd has presented *Polyporaceae*, chiefly cotypes of recently described species. The collection of fungi has also been increased by the presentation by the Bentham Trustees of Mr. C. Crossland's British herbarium, containing over 2000 specimens and accompanied by about 500 drawings (*see* Kew Bulletin, 1914, 173), and by the presentation of specimens collected in the Southern Provinces of Nigeria by Mr. C. O. Farquharson. The Herbarium of the Imperial Botanic Garden, Petrograd, has contributed a set of Russian and Manchurian plants. Mr. W. B. Turrill has presented a set of 380 specimens collected during his tour in Ireland last summer.

The Chinese collections have been enriched by the presentation by Messrs. Jas. Veitch and Sons of the specimens collected for them by Messrs. E. H. Wilson and W. Purdom, and by those collected on the Burma-Chinese frontier by Mr. G. Forrest and presented by the Royal Botanic Garden, Edinburgh. Mr. H. C. Robinson's collection from the Malay Peninsula has been worked out at Kew by Mr. H. N. Ridley, who also determined a large number of the Dutch New Guinea plants collected during the Wollaston expedition by Mr. C. Boden Kloss and presented by the Trustees of the British Museum.

Mr. C. E. F. Allen, Curator of the Botanic Gardens, Port Darwin, Northern Territory of Australia, has sent a set of plants collected by him in that district and containing a large proportion of grasses, one of which proved to be undescribed.

Tropical Africa has furnished a large number of collections, including that from Sierra Leone by Mr. N. W. Thomas, Government Anthropologist, who has succeeded in sending very well-preserved specimens by the wet box method. Additional specimens have been received from the Percy Sladen Expeditions in the southern part of Africa. Geheimrat Prof. A. Engler has presented specimens and photographs of his African species of *Commiphora*.

The valuable collection of North American grasses received from the U.S. Department of Agriculture contained many novelties described by Messrs. A. S. Hitchcock and W. R. Maxon, and also filled other gaps in the herbarium. The North American mosses from the herbarium of the late Dr. N. C. Kindberg have been acquired from his son, Major Kindberg, and include many types. The New York Botanical Garden has continued to present, through Dr. N. L. Britton, specimens from various West Indian islands. Dr. Marshall Howe has presented a collection of West Indian Algae, including many calcareous species described by himself and the late Mr. M. Foslie.

Presentations to the Library during 1914.—The Bentham Trustees have presented a copy of *The Genus Iris*, by W. R. Dykes; a scarce edition of Dioscorides, with additions by Petrus Peduensis, published at Lyons in 1512; Pliny's *Historiae naturalis libri* xxxvii., Venice, 1507; and the following more or less rare works:—Nigrisoli, *Febris China Chinae expugnata*, ed. 2. Ferraria, 1700; Perla, *De orientali Opobalsamo nuper in Theriacae confectione adhibito . . . dissertatio*, Rome, 1641; Pona, *Tratto de' Veleni, e lor cura*, Verona, 1643; Ruiz Lopez, *Della China e delle altre sue specie*, etc., Rome, 1792; Stella, *Il Tabacco, opera . . . nella quale si tratta dell' origine, historia, coltura*, etc., Rome, 1669; and Vivenzi, *De Cicuta commentarius*, ed. 3. Naples, 1774. In addition to these about 30 serial or periodical publications received in exchange for *Hooker's Icones Plantarum* have been presented by the Bentham Trustees.

A note in the *Kew Bulletin*, 1914, p. 228, announced that the library now possesses a copy of *The Genus Rosa*, which the author, Miss Ellen Willmott, has generously presented. In this fine work, which contains many beautiful coloured drawings by Mr. Alfred Parsons, R.A., we have a monograph of the rose worthy of the beauty of this universally favourite flower, and of the greatest value and interest to artist, botanist and gardener.

Lady Hooker has continued to send to Kew the *Comptes Rendus* of the Academy of Sciences, Paris, and Miss Alice Eastwood, of the California Academy of Sciences, has sent the weekly issues of *Science*.

The Secretary of State for India has contributed two further volumes of Mr. Foster's work, *The English Factories in India*, dealing with the period 1642–1650; also the following:—*Indian Forest Insects of economic importance: Coleoptera*, by E. P. Stebbing; *List of Trees, Shrubs and Climbers . . . found in the Berar Forest Circle*, by D. O. Witt; and the *Botanical Bulletin*

of the Presidency College, Madras, containing *Madras Flowers*, edited by P. F. Fyson.

From Sir Frank Crisp, Bart., the library has received a copy of W. J. Bean's *Trees and Shrubs hardy in the British Isles*, a work in two volumes which will undoubtedly be regarded for many years to come as the standard treatise on hardy ligneous plants; also *Orchidacées de Madagascar*, by R. Schlechter. The latter has been reprinted from the *Annales du Musée Colonial de Marseille*, 3me série, vol. i.

The Rev. Canon Ellacombe has presented an excellent copy of Caspar Bauhin's *Theatri Botanici Liber Primus*, Basileae, 1658, differing from that previously at Kew in possessing various indexes at the end of the volume and in being deficient in the portrait of C. Bauhin which is sometimes found on the reverse of the half-title page. A good copy of *The New Flora Britannica*, which is sometimes provided with the title *The New Botanic Garden*, a work in two volumes, consisting of 60 coloured plates of cultivated plants by Sydenham Edwards, with descriptive text. has also been received from him.

A copy of *Die oberschlesische Steinkohlenflora*, Teil 1. by W. Gothan, and about 80 pamphlets on palaeobotany, by various authors, have been received from Mr. Clement Reid.

The fourth part of *Plantae Wilsonianae*, edited by C. S. Sargent; the first volume of the *Catalogue* of the fine library of the Arnold Arboretum; and *The Genus Pinus*, by G. Russell Shaw. have been presented by the Director of the Arnold Arboretum.

The Director of the Department of Agriculture in the Dutch East Indies has sent numerous publications of the department, including the final part of J. J. Smith's *Die Orchideen von Java: Figuren-Atlas;* and from the Director of the Botanic Garden, Utrecht, have been received *Flora voor de Nederlandsch West-Indische Eilanden* and *The Flora of Curaçao, Aruba and Bonaire*, both by I. Boldingh.

As in previous years a number of publications of the Geological Survey of Canada has been sent to Kew by the Director.

The first part of the *Flora Sibiriae et Orientis extremi*, edited by officers of the Botanical Museum of the Imperial Academy of Sciences, Petrograd, has been presented by the Administration of the Museum.

From the Botanical Museum, Upsala, 19 books and pamphlets by R. E. Fries and Th. C. E. Fries, including *Botanische Untersuchungen im nördlichsten Schweden* by the latter, have been received; while Dr. R. E. Fries has personally contributed to the library a copy of his *Botanische Untersuchungen der wissenschaftlichen Ergebnisse der Schwedischen Rhodesia-Kongo-Expedition, 1911–12*, Bd. i. Heft 1.

Among other accessions to the library the following presentations should be mentioned:—*The Annals of the Bolus Herbarium*, from the Trustees of the Bolus Herbarium through the kind offices of Prof. H. H. W. Pearson; the second paper of the first part of *The Botany of Iceland*, from the editors, Dr. L. Kolderup Rosenvinge and Dr. Eug. Warming; *The British Pharmacopœia*, 1914, from the General Medical Council; *The Coco-nut*, by E. B.

Copeland, from the publishers, Messrs. Macmillan and Co.; *The Horticultural Record*, compiled by R. Cory, from Mr. W. J. Bean; *Beknopt overzicht der meest gebruikte Geneesmiddelen in Nederlandsch Oost-Indië*, by J. van Dongen, from the Koloniaal Instituut, Amsterdam; *Elements of the Science of Botany as established by Linnaeus*, ed. 3, 3 volumes, by R. Duppa, from Mrs. Luckhurst; *The Banana*, by W. Fawcett, from the publishers, Messrs. Duckworth and Co.; *Monographische Studien an Treubia insignis*, Goebel, by C. Gruen, from Prof. Hans Schinz; *Handbook of fungus diseases of the Potato in Australia and their treatment*, by D. McAlpine, from the Agent-General for Victoria; *The Forest Flora of New South Wales*, by J. H. Maiden, parts 51–54, from the Secretary of Agriculture, Sydney, while the continuation of the same author's *Critical Revision of the Genus Eucalyptus*, of which 21 parts have now been published, has been received from Mr. Maiden himself; the parts of the *North American Flora* issued during the year have been received from Dr. N. L. Britton; *The Weed Flora of Iowa*, by L. H. Pammel and others, from the Iowa Geological Survey; volume viii. of *The Rothamsted Memoirs*, from the Secretary, Board of Agriculture and Fisheries; *An Account of the Morisonian Herbarium*, etc., by S. H. Vines and G. C. Druce, from the Delegates of the Clarendon Press, Oxford; *Webbia*, vol. iv. pt. 2, from the editor, Prof. Ugolino Martelli; and *A Monograph of the Genus Sabicea*, by H. F. Wernham, from the Trustees of the British Museum.

The following have been presented by their respective authors:—*The Standard Cyclopedia of Horticulture*, by L. H. Bailey, vol. i–ii; *Atlas de la Flore d' Algérie*, by J. A. Battandier and L. Trabut, fasc. 3–4 (from Prof. L. Trabut); *La Agricultura Colonial*, by M. B. Berro, a work dealing historically with agriculture mainly in Paraguay, Uruguay and Argentina; also *Las Gramineas de Verá*, by the same author; *The Species of Sargassum found along the coasts of the Danish West Indies*, etc., and *The Marine Algae of the Danish West Indies*, part 2, both by F. Börgesen; *A Monograph of the Genus Dryopteris*, part 1, and *Revision of the American Species of Dryopteris*, etc., both by C. Christensen; a volume of papers by Sir Arthur H. Church on *Colein*, *Vegetable Albinism*, and *Aluminium in Plants*, etc.; *Untersuchungen über die Flechtengonidien*, by F. E. Elfving; *Contribuzioni diatomologiche*, by A. Forti; *Λεξικον φγτολογικον* etc., by P. G. Gennadius; *A Flora of California*, by W. L. Jepson, part 4; *List of Trees, Shrubs, and principal Climbers, etc., recorded from Burma*, by J. H. Lace; *The Fungus Flora of Yorkshire*, by G. Massee and C. Crossland, with MS. additions by the latter (from Mr. C. Crossland); *Date growing in the Old World and the New*, by P. B. Popenoe; *Remarques sur les Sphacélariacées*, by C. Sauvageau; *Antarctic Fossil Plants* ('Terra Nova' Expedition, 1910), by A. C. Seward; and *Flowering Plants of the Riviera* as well as *Subalpine Plants*, by H. Stuart Thompson.

Among the manuscripts there is a presentation by Dr. W. Botting Hemsley of a list compiled by himself of the plants contained in No. 15, 'Museum Stove,' Royal Botanic Gardens, Kew, in the autumn of 1862; while a list of stove and greenhouse plants

at Kew, compiled by Alexander Smith in 1848, has been presented by Mr. J. R. Jackson. From Messrs. James Veitch and Sons has been received a memorandum book containing notes on the seeds collected for them in China by Mr. W. Purdom.

Numerous other contributions made to the library during the year, received as presentations from institutions, authors and other sources, which it has not been possible to particularise in this note, will be included in the supplement to the catalogue forming Appendix II. to the *Kew Bulletin*, 1915.

Botanical Magazine for January.—The plants figured are *Encephalartos Hildebrandtii*, A. Braun & Bouché (tt. 8592 & 8593); *Cotoneaster pannosa*, Franch. (t. 8594); *Mesembryanthemum thecatum*, N. E. Br. (t. 8585A), and *Mesembryanthemum stylosum*, N. E. Br. (t. 8595B).

The handsome *Encephalartos* was first discovered by Sir John Kirk near Dar-es-Salam on the East African Coast in 1868, and seeds, some of which germinated, were sent by him to Kew in 1870. The plates, giving figures of both male and female cones, were prepared from material obtained from two plants grown on from stems received from Sir John Kirk in 1884. The same Cycad was found later by J. M. Hildebrandt, after whom it was named, on the part of the coast opposite the island of Zanzibar and at other places as far north as Mombasa. The stem is sometimes very short, but may reach a height of 20 feet. The cones are cylindric, the male pedunculate, 8-18 inches long, while the female is subsessile and up to 2 feet long. Some interesting points in connection with this plant, including its affinities with the Natal *E. villosus*, Lem., are discussed in an article by Dr. O. Stapf in the *Kew Bulletin*, 1914, p. 386.

Cotoncaster pannosa is a native of South-Western Yunnan, where it was originally found by the late Abbé Delavay at altitudes of about 8000 feet above sea-level, and through him was introduced to the Jardin des Plantes, Paris, where some young plants were raised in 1888. The material figured was furnished by a plant received from the Jardin des Plantes in 1894. The species is closely allied to *C. Franchetii*, Bois, and has sometimes been confused with it, but it is distinguished by its smaller leaves with longer petioles, more spreading petals of a purer white, and smaller fruits of a duller deeper red. It is very ornamental in the fruiting stage and succeeds in a naturally poor soil.

The curious and pretty little *Mesembryanthemum thecatum* is a new species discovered by Prof. H. H. W. Pearson in the Van Rhynsdorp Division of Cape Colony during the Percy Sladen Expedition to the Orange River in 1910-11. Its leaves are consolidated into obconic bodies about $\frac{1}{3}$ inch thick, which are bluish-green with dull green markings. The flowers are rose-purple with a yellow eye, and each lasts from four to six days, opening in the morning and closing at night.

Mesembryanthemum stylosum is also a new species and is a native of Little Namaqualand, where it was collected during the expedition named in the preceding paragraph. It formed part of

the valuable collection of succulents received at Kew from Prof. Pearson in 1911. In this plant the foliar bodies are deeply bilobed at the apex and the flowers are bright yellow. The latter, as in *M. thecatum*, are odourless, and last for five or six days.

Greenland Algae.—Mr. H. N. Dixon has presented to Kew a small collection of marine algae, made by Mr. Edward Whymper and Dr. Robert Brown of Campsler, on the coasts of Greenland in 1867. Robert Brown, who, to distinguish himself from the great botanist added Campsl. to his name, took part, in 1867, in a trip to W. Greenland, and the same year Whymper visited Greenland in order to study Arctic travel and ice phenomena. Brown had charge of the natural history collections for the expedition, and an account of the botanical material appeared in a series of articles by various authors in the transactions of the Edinburgh Botanical Society, the algae being dealt with in vol. ix. p. 456–464 and 465–467. Whymper apparently had a collection of his own, and at his death this, together with his mosses collected during the same expedition, passed into Mr. Dixon's hands through his brother, Mr. Charles Whymper.

A. D. C.

Sea Island Cotton in the West Indies.*—The latest publication to hand issued by the Imperial Department of Agriculture for the West Indies is a stout pamphlet dealing very fully and concisely with the above subject. It is described in the preface as a compilation undertaken by Mr. W. Nowell, D.I.C., in consultation with the principal agricultural officers working in association with the Agricultural Department. The facts in the pamphlet are brought, as far as possible, up to date, and it is believed that the work will prove a useful and reliable guide to those concerned in the West Indian Sea Island cotton industry.

The opening chapter gives a general historical review of the industry, followed by others on the botany, cultivation, picking and grading, examination of seed cotton and lint, seed selection, insect pests and diseases, and an appendix of useful additional information.

The chapters on botany and diseases are from the pen of the compiler, whilst that on insect pests is the work of Mr. H. A. Ballou, M.Sc. The original matter embraces fully half of the book and, being freely illustrated, is of particular value.

The general information contained in the work has evidently been selected with great care, and although more pretentious publications are available this latest addition to the literature bearing upon the cotton industry should certainly be consulted not alone by West Indian planters but by those interested in the subject in other cotton-producing countries.

J. M. H.

---

* Cotton Cultivation in the West Indies. Imperial Department of Agriculture for the West Indies. Pamphlet series, No. 54. 1914, 118 pp. with numerous illustrations. Price 9d.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 2] [1915

IV.—DIOSPYROS EBENASTER.

M. B. Scott.

Diospyros Ebenaster, Retz. is a widely cultivated tree, and is recorded from various botanic gardens in different parts of the world, but the information concerning its natural habitat is often contradictory and apparently inexact or incomplete. The object of these notes is to attempt to remove the confusion which has naturally arisen from such conflicting data, and to determine if possible the natural home of the plant.

Blanco in his "Flora de Filipinas," p. 211, says that the plant is indigenous to the Philippine Islands, but that the Indians cultivate it. Merrill, however, writes on the label attached to his specimen 3800 from Manila (December 17th, 1903), "Cultivated only in Philippines, Blanco to contrary notwithstanding, and now rarely found." The same authority, in his recent "Flora of Manila," p. 364, states that the tree is rarely cultivated and only of local occurrence in the Philippines, adding that it was "introduced from Mexico at an early date, and apparently formerly much more common than now." Hiern in his monograph of the *Ebenaceae* follows Blanco and quotes the following:—"Philippines, *Sonnerat, Blanco;* Celebes, *Jacquin;* Amboina, *Rumph.*," adding, "Cultivated in Mauritius, at Calcutta, and Malacca, *Maingay* 975. Occurs also in cultivated places in tropical America, perhaps introduced." As we have pointed out, Merrill states that Blanco is wrong, while Koorders does not record the plant from Java or Celebes. We may note that Jacquin in "Hort. Schoen.," vol. iii. p. 35, is not very explicit as to the locality of the plant, saying only, "Crescit in insula Celebes. Culta in insula Mauritii." Rumphius is more definite; he says that it is "rare in Amboina, only one here and there in the region of Hitoe and in Banda, but frequent in Ceram and certainly in Bonoa; likewise in Sumatra round Jamby." From this it would appear that the tree is a native of these islands. The plant, however, which Rumphius figures and calls "Hebenaster" is reduced by Miquel in his "Flora van Nederlandsch Indië," vol. ii. p. 1047, to *D. Ebenum* Retz. (which, by the way, should be *D. Ebenum* Koen., as Koenig described it in

(3706.) Wt. 225–595. 1,125. 3/15. J. T. & S. G. 14.

1776 and Retzius in 1789). Further, Miquel makes no mention of *D. Ebenaster*. Rumphius gives various vernacular terms applied to "Hebenaster" by the natives of the different islands—a few of these being *Ahuelloc, Gamomong, Lolin, Lorin*, all of which, according to Filet, are popular names for *D. Ebenum*. Lastly, if we take Rumphius' description and figure, we find that they agree more closely with *D. Ebenum* than with *D. Ebenaster*, notably in the leaves being acute at the apex and having on their under surface a few hairs at the bases of the nerves. It is evident, therefore, that Rumphius' plant is *D. Ebenum*, Koen.

With regard to Malacca, Maingay's specimen 975 bears a note in pencil to the effect that the plant is cultivated, while *Loher* 407 is from the Botanic Garden at Manila.

The bulk of the evidence, then, points to *Diospyros Ebenaster* being introduced into the East Indies. The earliest record of the plant is apparently that of Sonnerat, who found the tree on his visit to the Philippines, and described and figured it in his "Voyage à la Nouvelle Guinée" (pp. 45–46, tt. 14–16), published in 1776. That the tree in all probability was introduced before this date is credible, for the Philippines were kept in close touch with Mexico and the West Indies by means of the Spanish galleons which plied the Pacific regularly from the late 16th or early 17th century up till the beginning of the 19th century. This period was one of great commercial activity among the Spaniards, and various authorities tell us that many trees and shrubs (mostly of some economic value) were introduced into the East Indies from Mexico and the Spanish islands of the West.

Urban in the "Symbolae Antillanae," iv. p. 485, is apparently convinced that the tree is a native of the West Indies, and gives its locality in the Antilles as "Prope Toa-Alta in montibus: *Stahl* 872." The fact that the plant was found growing in the mountains would appear to be conclusive. Urban also gives the following localities, "Cuba, Monserrat, Guadeloupe, Dominica, Mexico, Brasilia, insulae Malayanae," and adds on the authority of Duss that the tree is certainly indigenous to the Antilles since it was found growing in the woods in the interior of Guadeloupe. Duss' discoveries leave us in no doubt whatever, for he found the tree in various wild places. His own words are, "Assez abondant dans les bois du massif du Houëlmont, plus rare dans les bois des Bains-Jaunes et du Gommier; se rencontre aussi dans les hauteurs de Bouillante (Trou au Trois-Diables), et dans les bois inférieurs de la Pointe-Noire (No. 2573): Il n'est pas à la Martinique."

Unfortunately, the American material of *Diospyros Ebenaster* in the Kew Herbarium is somewhat limited. Of the specimens from Mexico, *Botteri* 909 from Orizaba would appear to indicate that the tree is native there—but Bourgeau's specimens 1823 and 2327 from the valley of Cordoba are cultivated (on the authority of Hiern). Urbina, in his catalogue of Mexican plants, makes no mention of the tree, while Sessé and Mociño in the "Plantae Novae Hispaniae" (2nd ed.), p. 166, and also in the "Flora Mexicana" (2nd ed.), p. 237, speak of it as *Diospyros Tlilzapotl*, and

give its habitat as "in calidis Novae Hispaniae regionibus." Their description of the plant agrees with that of *D. Ebenaster*. Ramirez, in his "Sinonimia de las Plantas Mexicanas," p. 94, gives the vernacular name as "Tlilzápotl" and the locality as Morelos. Hernandez (who explored Mexico between 1571 and 1577) on two separate occasions in his "Opera" (p. 129 and p. 164 of vol. i.), speaks of the medicinal properties of the tree, but the figure of "Tlilzápotl" in Recchus' edition of Hernandez, p. 430, does not agree with *D. Ebenaster* in that the fruits are somewhat pointed at the apex. Hemsley ("Biologia Cent. Americana," vol. ii. p. 300), states that the tree is only found in cultivated places, and is of the opinion that it has been introduced.

From Brazil, *Glaziou* 7747 is cultivated, and it may be noted that Martius in the "Flora Brasiliensis" is very vague as to the exact locality of *D. brasiliensis* (= *D. Ebenaster* according to Hiern), only stating that it grows in the interior! Part at least, if not all, of the material from Dominica is from the Botanic Gardens, so that the tree may be introduced there; but the fact that it is popularly called "bambarra" by the natives in the island suggests that it may be indigenous and more common than our specimens indicate.

From the evidence we have collected, therefore, we must conclude that the natural habitat of *Diospyros Ebenaster*, Retz., is in the West Indies. With regard to Mexico, it is evident from the references quoted above that the tree must have existed there for at least three centuries. As the native name "Tlilzápotl" is merely the Indian rendering of the Spanish "Zapote negro," it is very probable that the tree was introduced into Mexico by the Spaniards, but if this be correct, the introduction must have taken place at a very early date.

It may be fitting to conclude these remarks with a note on the narcotic or poisonous properties of the fruit of this interesting tree. The fruit is large, reaching three inches in diameter; it is globose in shape and of an olive- or yellowish-green colour, while the pulp is dark. The fruit (including the seeds) is pounded and thrown into the rivers by the natives of the West Indies in order to stupefy the fish and so facilitate their capture. Some observers—Greshoff being the most recent of them—declare that the fish are killed by partaking of this fruit.

V.—THE SOUTH AFRICAN SECTIONS OF LORANTHUS.

T. A. SPRAGUE.

The genus *Loranthus** has been divided into a large number of groups, which have been treated by Van Tieghem as independent genera, by Engler as subgenera, sections and series.†

---

* As defined in Engler & Prantl, Nat. Pflanzenfam, vol. iii., 1, p. 183.
† See Kew Bull. 1914, pp. 362–367.

In 1910, the 215 species of *Loranthus* then known from Tropical Africa were classified by the writer in 29 sections.* The South African species have been arranged in a similar way in the forthcoming part of Dyer, Flora Capensis, vol. v. sect. 2, but owing to the relatively small number of species concerned, it seemed inadvisable to introduce the names of the sections into the key. In order to facilitate comparison with the classification adopted in The Flora of Tropical Africa, a key and enumeration of the South African sections are now given.

KEY TO THE SECTIONS.

Corolla polypetalous.
  Flowers tetramerous; petals under $\frac{3}{4}$ in. long; claws without ridges.
    Anthers transversely septate ... ... I. Sycophila.
    Anthers not transversely septate ... II. Acrostachys.
  Flowers pentamerous; petals $1\frac{1}{2}$–$2\frac{1}{4}$ in. long; claws with several pairs of oblique ridges, which descend from the adnate portion of the filament ... ... III. Plicopetalus.
Corolla gamopetalous.
  Filaments not produced into a tooth in front of the anther.
    Anthers transversely septate ... ... IV. Septulina.
    Anthers not transversely septate.
      Corolla-tube not splitting unilaterally.
        Corolla-lobes revolute ... ... V. Moquinia.
        Corolla-lobes reflexed.
          Corolla glabrous.
            Filaments straight, not thickened above ... ... VI. Tetrameri.
            Filaments much thickened and involute above ... ... VII. Incrassati.
          Corolla villous with subappressed hairs ... ...VIII. Hirsuti.
        Corolla-lobes erect, cohering unilaterally in a single piece ... IX. Quinquenerves.
      Corolla-tube splitting unilaterally.
        Umbels terminating leafy shortshoots, which are perulate at the base ... ... X. Acranthemum.
        Umbels axillary ... ... XI. Infundibuliformes.
  Filaments produced into a tooth in front of the anther.
    Flowers pentamerous; style skittle-shaped above.
      Corolla-lobes reflexed ... ... XII. Tapinanthus.
      Corolla-lobes erect ... ...XIII. Erectilobi.
    Flowers tetramerous; style not skittle-shaped ... ... XIV. Ischnanthus.

* Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 256–273.

Sect. I. Sycophila, *Engl.* in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 128; Sprague in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 257. Genus *Sycophila*, Welw. ex Van Tiegh. in Bull. Soc. Bot. France, vol. xli. p. 485 (1894). Sect. *Hcteranthus*, Benth. & Hook. f. Gen. Pl. vol. iii. p. 208, partim; Engl. in Nat. Pflanzenfam. vol. iii. p. 185, partim.

S. African species: *L. Woodii*, Schlechter & Krause. *L. subcylindricus*, Sprague.

Sect. II. Acrostachys, *Benth.* in Benth. & Hook. f. Gen. Pl. vol. iii. p. 208 (1880); Engl. in Engl. & Prantl, Nat. Pflanzenfam. vol. iii., 1, p. 188; Nachtr. i., p. 133; Sprague in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 256, 258. Genus *Acrostachys*, Van Tiegh. in Bull. Soc. Bot. France, vol. xli. p. 504.

S. African species: *L. garcianus*, Engl.

Sect. III. Plicopetalus, *Benth.* in Benth. & Hook. f. Gen. Pl. vol. iii. p. 208 (1880); Engl. in Engl. & Prantl, Nat. Pflanzenfam. vol. iii., 1, p. 188; Engl. Jahrb. vol. xx. p. 130; Sprague in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 256, 258. Sect. *Euplicotepalus*, Engl. in Nat. Pflanzenfam. Nachtr. i. p. 133. Genus *Plicosepalus*, Van Tiegh. in Bull. Soc. Bot. France, vol. xli. p. 504.

S. African species: *L. undulatus*, E. Meyer. *L. kalachariensis*, Schinz.

Sect. IV. Septulina, *Sprague* in Kew Bull. 1914, p. 367. Genus *Septulina*, Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 263 (1895). Series *Cinerascentes*, Engl. in Engl. & Prantl. Nat. Pflanzenfam. Nachtr. i. p. 131, partim. Series *Longitubulosi*, Engl. & Krause in Engl. Jahrb. vol. li. p. 455 (1914).

Endemic in S. Africa. Differs from sect. *Cinerascentes* in the tetramerous flowers, reflexed* corolla-lobes, and erect filaments.—*L. glaucus*, Thunb., *L. oralis*, E. Meyer.

Sect. V. Moquinia, *Sprague* in Kew Bull. 1914, p. 367. Genus *Moquinia*, A. Spreng. Tent. Suppl. Syst. Veg. p. 9 (1828). Series *Oleaefolii*, Engl. in Engl. Jahrb. vol. xx. p. 83. Series *Lichtensteinia*, Engl. in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 131. Genus *Lichtensteinia*, Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 254, non Wendl.

Endemic in S. Africa. Allied to sect. *Tetrameri*, from which it differs in the revolute corolla-lobes.—*L. elegans*, Cham. & Schlecht.

Sect. VI. Tetrameri, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 256, 264 (1910). Series *Tetrameri*, K. Krause in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. iv. p. 72. Series *Longiflori*, Engl. in Engl. Jahrb. vol. xx. pp. 82, 92, partim; Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 131, partim.

S. African species: *L. Galpinii*, Schinz.

---

* By a typographical error the corolla-lobes were stated to be erect in Kew Bull. 1914, p. 367.

Sect. VII. Incrassati, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 256, 263 (1910). Series *Incrassati*, K. Krause in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. iv. p. 72.
S. African species: *L. Wyliei*, Sprague.

Sect. VIII. Hirsuti, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 256, 263. Series *Hirsuti*, Engl. in Engl. Jahrb. vol. xx. p. 104 (1894); Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 132. Genus *Erianthemum*, Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 247.
S. African species: *L. Dregei*, Eckl. & Zeyh.

Sect. IX. Quinquenerves, *Sprague*. Leaves alternate. Umbels axillary; bract cupular. Flowers pentamerous. Receptacle and calyx together cylindric, longer than the bract. Corolla-tube not splitting unilaterally, with a distinct basal swelling; limb splitting unilaterally, the lobes remaining connate above in a single erect piece. Stamens inserted a considerable distance above the base of the corolla-lobes; filaments filiform, inflexed or involute, with two minute teeth below their apex on the ventral surface; anthers linear, not transversely divided. Style filiform; stigma subglobose.
Endemic in S. Africa. Allied to Sect. *Incrassati*, from which it differs in the corolla and filaments. Type and sole species: *L. quinquenervis*, Hochst.

Sect. X. Acranthemum, *Sprague*. Genus *Acranthemum*, Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 254 (1895). Series *Acranthemum*, Engl. in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 131.
Endemic in S. Africa. Allied to Sect. *Longiflori*, from which it differs in the umbels terminating leafy short-shoots, which are perulate at the base, and the filaments inserted near the base of the corolla-lobes. The style is skittle-shaped above in 3 out of the 4 species.—*L. Zeyheri*, Harv., *L. Moorei*, Sprague, *L. natalitius*, Meisn., *L. minor*, Sprague.

Sect. XI. Infundibuliformes, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 257, 264. Series *Infundibuliformes*, Engl. in Engl. Jahrb. vol. xx. pp 82, 89 (1894); Engl & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 132 Series *Inflati*, Engl., l.c. 82, 91; l.c. 132. Series *Glomerati*, Engl., l.c. 82, 88. Genus *Agelanthus*, Van Tiegh. in Bull. Soc. Bot. France. vol. xlii. p. 246.
S. African species: *L. Bolusii*, Sprague.

Sect. XII. Tapinanthus, Blume, Fl. Jav. Loranth. p. 15; Endl. Gen. Pl. vol. ii. p. 802, excl. *Moquinia*; Benth. in Benth. & Hook. f. Gen. Pl. vol. iii. p. 210, excl. *L. dodonaeifolius* et *L. Schimperi*; Engl. in Engl. & Prantl, Nat. Pflanzenfam. vol. iii. 1, p. 187, partim; Sprague in Kew Bull. 1914, p. 367. Genus *Tapinanthus*, Blume apud Schult. Syst. Veg. vol. vii. p. 1730 (1830); Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 267, partim. Genus *Lichtensteinia*, Wendl. Coll. Pl. vol. ii. p. 4. t. 39 (1810); Blume apud Schult. Syst. Veg. vol. vii.

p. 1730. Sect. *Lichtensteinia*, Blume, Fl. Jav. Loranth. p. 14. Series *Constrictiflori*, Engl. in Engl. Jahrb. vol. xx. pp. 108, 113, partim; Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 133, partim. Sect. *Constrictiflori*, Sprague in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 257, 268.

S. African species: *L. rubromarginatus*, Engl., *L. oleaefolius*, Cham. & Schlecht. (*L. namaquensis*, Harv.).

Sect. XIII. Erectilobi, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 257, 270 (1910). Series *Erectilobi*, K. Krause in Engl. & Prantl, Nat. Pflanzenfam. Nachtr. iv. p. 73. Series *Constrictiflori*, Engl. in Engl. Jahrb. vol. xx. pp. 108, 113. partim. Genus *Tapinanthus*, Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 267, partim.

S. African species: *L. Kraussianus*, Meisn., *L. prunifolius*, E. Meyer.

Sect. XIV. Ischnanthus, *Engl.* in Engl. Jahrb. vol. xx. p. 125 (1894); Engl. & Prantl, Nat. Pflanzenfam. Nachtr. i. p. 132; Sprague in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, pp. 257, 272. Genus *Ischnanthus*, Van Tiegh. in Bull. Soc. Bot. France, vol. xlii. p. 260. Genus *Stephaniscus*, Van Tiegh, l.c.

S. African species: *L. Schlechteri*, Eng.

The distribution of the South African sections of *Loranthus* exhibits certain features of interest. Three of the four endemic sections, *Moquinia*, *Quinquenerves* and *Acranthemum* are related respectively to the East African sections *Tetrameri*, *Incrassati* and *Longiflori*, whilst the fourth, *Septulina*,, is allied to the West African *Cinerascentes*. Of the non-endemic groups, six* occur both in East and West Tropical Africa, three† in East Africa only, and one‡ in West Tropical Africa. Thus the relationship of both the endemic and non-endemic groups with those of East Tropical Africa is three times as great as with those of West Tropical Africa.

The section *Sycophila* affords a good example of discontinuous distribution, nine species occurring in West Tropical Africa (Cameroons to Angola), and two in Natal and Zululand. *Sycophila* is regarded by the writer as one of the most primitive of the African sections, on account of the flowers being arranged in racemes,§ the polypetalous corolla, and the straight erect filaments. Its discontinuous distribution is in keeping with this hypothesis.

---

* *Acrostachys*, *Plicopetalus*, *Infundibuliformes*, *Constrictiflori*, *Erectilobi*, *Ischnanthus*.

† *Hirsuti*, *Incrassati*, *Tetrameri*. The section *Hirsuti* includes 10 species, 9 of which are confined to East Africa, whilst the tenth, *L. Dregei*, is widely distributed in East Africa, from Eritrea to the Komgha Division of Cape Colony, and extends into Angola. For the purposes of the present comparison this extension is best neglected.

‡ *Sycophila*.

§ In most of the sections the flowers are in umbels, fascicles or capitula. *Moquinia* exhibits transitional forms between a raceme and an umbel.

VI.—THE SELECTION OF COCOANUTS FOR GERMINATION.

In connection with the propagation of cocoanuts it is a widely held belief that the nuts from young trees should not be used and that plants should only be raised from fully-matured trees.

This belief appears to be based on the following passage from Simmonds' "Tropical Agriculture"* :—"The nuts for sprouting should be chosen from those fully ripe, having full, large eyes, and such as have been gathered from trees past the middle age—not, however, from aged ones—and from clusters containing few fruits. These, if carefully planted, are said to ensure the timely sprouting and steady growth of the plant as well as future luxuriance, longevity, and unintermitting fruitfulness. . . . Those nuts which may be taken from trees of immature age will, if planted, rot away at the eye; and the plants, if any be successfully reared, on transplanting will grow very rapidly and acquire bulk, but the fruit will drop before the kernel acquires consistency, the root stalks break, and the trees entirely fail before mid age."

Efforts have been made to discover what truth there may be in the above statement, but neither direct confirmation nor absolute refutation has been obtained. On physiological grounds there would appear to be no justification for the statement as it stands, though no doubt it would be unwise for more than one reason to plant nuts from young trees in the first year or two of their coming into bearing.

We have failed to find any earlier reference in economic literature to the statement made by Simmonds, and it is not impossible that he may have based it on a superstitious native belief which had come to his notice. But all attempts to trace its origin have so far been unsuccessful. It is, too, not inconceivable that the statement may merely embody the argument of the owner of a plantation containing trees of a particular age, which was being offered for sale.

The following passage taken from a recent book on the Cocoanut, by E. B. Copeland,† deals with the vexed question of the seed nuts, and contains useful practical suggestions:—

"B. *Selection of the seed.*—Whatever variety of coco-nut may be chosen, the seeds which are to be planted should be selected as the product of individual trees, and these trees should be very carefully picked out and should be the ones which most exactly have the qualities which it is desirable to give to the entire plantation. There is no point in the coco-nut business where careful personal attention is more necessary or will prove more profitable than in the selection of the trees which are to furnish the seed nuts. Leaving out of account selection for any of the minor uses, and considering only the production of copra or oil, there is one safe and sufficient rule. Select the seed of the Trees

* Simmonds, P. L. Tropical Agriculture, pp. 220, 221. London, 1877.
† The Coco-nut. E. B. Copeland. London, Macmillan & Co., Ltd. pp. 116–118.

which are conspicuously more productive than are their neighbours which are growing under the same conditions.

"If a tree is especially productive because it grows in especially rich soil, or because it is well watered or well fertilized, or because it is freely illuminated on all sides, then, no matter how conspicuously productive it may be, there is no sound reason for choosing it as the source of seed. Seeds are chosen for their hereditary qualities, and a good environment cannot be inherited. A tree in the middle of a grove which regularly produces more nuts or larger nuts than its neighbours, and is without any compensating drawback, should be selected as the source of seed, even though a tree at the outside of the same grove which is still more productive be passed over.

"The selection of nuts from piles or at any time after they are cut from the tree is not to be recommended. A tree bearing very few nuts is for that reason likely to bear large ones, and it will thus often happen that the selection of large nuts from the nut pile is in effect selection from trees which are not very productive. Moreover, there is a chance that the large nuts in general nut piles are from trees which produce large nuts because they grow under especially favourable conditions, and, as we have just seen, there is no reason whatever why the fruit of such trees, however good it may be, should be selected for propagation.

"When the trees which are to be the source of seed nuts have been selected, their nuts should be regarded as having a value which is based on the value of the trees they will produce, and as therefore out of all proportion to the value which they have as mere nuts. It is worth while to harvest these nuts with a care which would be economically impossible for nuts intended for the production of copra. It is well worth while to collect the nuts of a good seed tree by lowering them to the ground by hand in order that there can be no risk of breaking or cracking them. A cracked nut will never germinate.

"The nuts are ready to be used for seed at the same time at which they are really ready to be used for copra, that is, when a third or a half of the water in the interior cavity has been used up. This condition can be recognized by the heaviness of the nut and by the noise which it makes when shaken."

The following paragraph taken from the "Directions for Planting Coco-nut Trees," issued by the Board of Agriculture, British Guiana, contains information very similar to that given by Copeland:—

"*Selection of Seeds.*—Nuts which are quite ripe should be chosen from trees which bear good crops of nuts having thin husks and thick kernels (copra), and which are neither very young nor very old. They should either be picked and not allowed to fall, as by so doing they may be injured, or, if not picked, fallen ripe nuts should be selected with uninjured husks; they should be kept a month before sowing. The larger ones on the bunches should be selected for planting, but very big nuts are not always the best, because only a few may be borne on the tree, while frequently their size is due to excessive development of husk at the expense of the kernel; oblong nuts should be avoided. The

large orange-red variety is the best for planting, in view both of size of coconut and of yield of copra."

One of the chief reasons, no doubt, for the recommendation that nuts should be taken from trees of some maturity is that the character of the nuts yielded by such trees would be well known, and it is probable that the nuts borne by quite young trees would not show their true character.

The following extract relating to seedling cocoanuts in the Laccadives* is also of interest in connection with this subject:

"In most of the islands it is deemed necessary to raise the seedling coco-nuts with care and attention till they are a year old, when they are transplanted and watered for a few weeks till they become firmly established. After this the young trees are left entirely to themselves, and are neither watered nor manured; they come into bearing in Kiltan in from 8 to 10 years, and produce fruit so vigorously and plentifully that it is sometimes necessary to support the luxuriant growth of nuts artificially; in this island, moreover, the preliminary attention to seedlings is not required.

"In some of the other islands, as in Chitlac, where the soil is much poorer, the trees do not come into bearing till they are 15 to 20 years old, each tree at best producing only about 50 nuts per annum as against80 to 85 nuts a year in Kiltan. In Kadamum, too, backward though the cultivation in that island is, the average per annum is about 80 nuts per tree; in Ameni, where the cultivation is almost as extensive as in Kiltan, the average is only about 60 nuts a year from each tree. These figures are given by Robinson, after careful and prolonged enquiry, as representing the yield in 1844 and 1845; Hume gives the average all over for the four British islands in 1875 at 80 nuts per tree per annum — doubtless rather a high general estimate, though probably representing the yield of what the people in any of the islands would themselves consider a good tree. Robinson thinks that 60 to 70 nuts would be a pretty fair general average for the whole of these islands, and this is likely to be nearer the truth than the higher estimate. The islanders try to plant only first-class trees, and they aim at obtaining such as will come into full bearing in about 10 years, throwing out every month after that age is reached a fruiting-spike bearing 15 to 20 nuts, and so yielding 180 to 250 nuts a year, and going on bearing at this rate till they are 60 years old. They often do go on bearing, it is said, till they are 70 or 80 years of age, and some are believed by the people to be more than a century old."

Young cocoanut trees vary considerably in the age at which they commence to yield, and in some cases as many as ten years may elapse before any nuts are borne. In pronouncing an opinion as to the proper age or size of trees from which seed nuts should be selected, it would be better therefore not to take nuts for this purpose until the trees are at least in their third or fourth year of bearing. Judging from particulars received of cocoanut plantations in the Island of Nevis, West Indies, it would appear that

* "Botany of the Laccadives," D. Prain in Journ. Bombay Nat. Hist. Soc. 1892, sec. 2, No. 5, pp. 65, 66.

cocoanut palms in their third year of bearing yield perfectly sound and full-sized nuts, which, when used for seed, can be relied upon to germinate freely and in a normal manner.

The plantations in Nevis were started by Mr. Crum-Ewing in the autumn of 1907 on old sugar-cane land, which is almost at sea-level. The soil is a nice loam, gradually getting lighter until it becomes pure sand on the sea-shore.

The average rainfall for the years 1909–13 inclusive was 43·87 inches, but the deficiency is compensated for by the plentiful underground supply of water draining from the high cone-shaped mountain which forms the centre of the small circular Island of Nevis.

The seed was obtained from Jamaica by Mr. Barclay, Secretary of the Jamaica Agricultural Society, who took some trouble to obtain nuts from the most healthy plantation in that Island. The seed for that plantation in turn came from San Blas, whence come the finest nuts in the Western Hemisphere.

The number of nuts planted up to the end of 1911 amounted to 10,305. The trees are planted 28 feet apart, or 52 to the acre. Certain trees commenced to bear in 1911, and Mr. Crum-Ewing saw one early in 1912, 4 years 4 months old, bearing 40 nuts. Reaping in any quantity, however, did not commence till 1913, when the 1907 plants would be about 5 years 3 months old.

From January 11, 1913, to June 30, 1914, the number of nuts harvested amounted to 23,807. From January 11 to October 23, 1913, a 4 in. gauge was used, which resulted in 77·4 per cent. of selects and 22·6 per cent. of culls. Both selects and culls were sent to New York, where the market took both grades as select, paying $42·50 per 1000, about the highest price which has been paid for any cocoanuts in that city. Since October 23 a $3\frac{7}{8}$ in. gauge has been used (which is $\frac{1}{8}$ in. larger than the Malay regulation gauge of $3\frac{3}{4}$ in.), and of the 75,116 nuts gathered, 68,419 or 91·08 per cent. have been select, and 6697 or 8·92 per cent. have been culls. A selection is made in the field of the nuts while in the husk, and it is found that 95 per cent. to 98 per cent. of these nuts when husked are over the $3\frac{7}{8}$ gauge.

In choosing nuts for seed, greater care is bestowed on selection than when husking and selling raw nuts is contemplated, so that the percentage of standard nuts would be increased. A certain number of trees are known not to give such a good percentage of selects, although the unhusked nuts from them look good. When selecting nuts for seed none are taken from these trees, which still further reduces the percentage of culls. The rots will not of course germinate, so that of the sprouts taken from the nursery, it may safely be assumed that nearly 100 per cent. are from nuts over the $3\frac{7}{8}$ in. standard.

Out of 1000 seed nuts sent to Demerara in July, 1913, it was reported on February 28, 1914, that 89 per cent. of these had germinated, that the others seemed quite good, and that more were expected to grow. In March, 1913, 50 nuts were planted standing up and 50 on their sides by way of experiment in Nevis. On October 24, 1913, it was reported that out of the 50 on their sides 46, or 92 per cent., had germinated, and of those standing up only 30 or 60 per cent. had germinated.

The high percentage of good-sized nuts on the young plantations at Nevis is of both general and commercial interest and affords ample justification for the great trouble which was taken in selecting the original seed nuts in Jamaica and elsewhere. As to the selection of the seed Mr. Crum-Ewing writes:—"I do not understand Simmonds' advice to take seed nuts from clusters containing few fruits—on a prolific tree there should be no such clusters. I quite agree with you that seed nuts should be taken from trees whose good character is well marked. It appears to me that the pedigree of a cocoanut tree is of the utmost importance. Even if I had only one or two years' experience of a tree, and it showed the same characteristics, for which its parent, and yet again its grand-parent had been selected, I would rather use the seed from that tree than take Simmonds' advice to choose one picked from a sparsely furnished cluster grown on a tree past the middle age, of whose parentage there is no record."

The nuts which are now being planted on Mr. Crum-Ewing's land in Nevis and in Demerara are taken from the young trees planted in Nevis in 1907. As already mentioned, the germination percentage of the nuts sent from Nevis to Demerara in July, 1913, was 89 per cent., which certainly refutes the statement made by Simmonds that nuts from young trees "rot away at the eye." Mr. Crum-Ewing informs us that he is planting nothing but his own Nevis seed both in the Island and in Demerara, and adds:—"I feel justified in so doing, knowing the great care with which the seed is selected, the minute observation to which the individual trees have been subjected, the absence of disease in the grove and in the Island, and the good stock from which the parents and grand-parents were derived."

These experimental plantings should, in the course of a few years, enable a proper estimation to be made of Simmonds' statements, but in the light of the practical experience already gained, it seems highly unlikely that his recommendations will receive support.

VII.—DIAGNOSES AFRICANAE: LXIII.

1541. **Heliotropium undulatifolium,** *Turrill* [Boraginaceae-Heliotropieae]; *H. longifloro*, Hochst. et Steud., affine, sed foliis minoribus angustioribusque undulatis, inflorescentiis brevioribus, corollis majoribus differt.

Fruticulus e basi lignosa praecipue ramosissimus, ramis adpresse hirsutis. *Folia* linearia vel oblongo-linearia, undulata, apice obtusa vel subobtusa, basi gradatim angustata, usque ad 2·5 cm. longa et 4 mm. lata, saepissime angustiora, pagina superiore dense adpresse hispida costa impressa nervis lateralibus inconspicuis, inferiore costa et nervis lateralibus prominentibus dense adpresse hispidis. *Inflorescentia* terminalis, e cymis 3–5 sub anthesi circiter 2·5 cm. (intructescentibus usque ad 6·5 cm.) longis composita, dense hispida, floribus sessilibus. *Calycis* segmenta 5, linearia, subacuta, 1·5 cm. longa, extra dense hispida; tubus 0·5 mm. longus. *Corollae* tubus cylindricus, medio leviter

ampliatus, 5 mm. longus, medio 1·25 mm. basi apiceque 1 mm. diametro, extra adpresse hispidus, intus glaber; limbus albus, circiter 7 mm. diametro, lobis 5 triangularibus apice acuminatis vel leviter caudatis basi 1·5 mm. latis. *Stamina* 2 mm. supra corollae tubi basem inserta, sessilia, 1 mm. longa. *Ovarium* fere sphaericum, circiter 0·5 mm. diametro, glabrum; stylus stigmate incluso 3 mm. longus; stigma anguste pyramidale, apice leviter bifidum, basi tumescens, 1·5 mm. longum. *Nuculae* 4, bilateraliter compressae, 3 mm. altae, diametro longiore 2 mm., breviore 1·5 mm., verrucis in lineas longitudinales dispositis instructae.

Tropical Africa. British East Africa: Lake Naivasha, 1800 m., *G. F. Scott Elliott* 6515. Kikuyu and on road to Eldama Ravine, 1200–1800 m., *A. Whyte*. Open plains beyond Guaso Nyoro, 1800 m., *M. S. Evans* 753, 767. West Kenya plains 1890–2040 m., *E. Battiscombe* 720. "Perennial herb, 5–12 inches, corolla white".

1542. **Solanum keniense,** *Turrill* [Solanaceae–Solaneae]; *S. scalari*, C. H. Wright, affine, sed ramis junioribus petiolisque pilis stellatis patentibus tectis, foliis pagina superiore pilis longis adpressis facie simplicibus sed sub oculo armato ima basi brevissime stellatim ramosis instructis, floribus majoribus, praecipue distinguendum.

Herba scandens (ex *Battiscombe*) ramis teretibus primo pilis stellatis patentibus tectis mox glabris. *Folia* oblongo- vel rhomboideo-ovata, apice acuta vel subacuminata, basi obtusa, interdum plus minusve inaequaliteralia, usque ad 12·5 cm. longa et 8 cm. lata, margine repando, pagina superiore costa et nervis lateralibus utrinque 4–5 leviter impressis, inferiore prominentibus, infra pilis stellatis parvis, supra pilis longis facie simplicibus sed sub oculo armato ima basi brevissime stellatim ramosis tectis; petioli usque ad 4 cm. longi, pilis stellatis patentibus instructi. *Inflorescentia* extra-axillaris, e floribus 6–8 (quorum usque ad 6 fertilibus) composita, pilis stellatis patentibus instructa, pedunculo 1–1·5 cm. longo suffulta; pedicelli usque ad 1·2 cm. longi. *Calycis* segmenta acuminata, 4 mm. longa, 1·5 mm. lata, extra dense stellato-tomentosa, intus glabra. *Corolla* quinquelobata, 1·7 mm. diametro, lobis 7 mm. longis 5 mm. latis extra minute stellato-tomentosis intus glabris. *Stamina* 5, filamentis 0·5 mm. longis, antheris 5 mm. longis apice biporosis. *Ovarium* ovoideum vel obovoideum, 1–1·5 mm. altum, 0·75–1 mm. diametro, glabrum vel apice leviter stellato-pubescens; stylus 8 mm. longus, inferne dense stellato-pubescens; stigma leviter bilobatum. *Bacca* sphaerica, 8 mm. diametro, rubra.

Tropical Africa. British East Africa; Eastern Kenya forests, 1350 m., *E. Battiscombe* 853. "Corolla mauve, ripe fruit red."

1543. **Arthrosolen variabilis,** *C. H. Wright* [Thymelaeaceae - Euthymelaeeae]; *A. gymnostachyi*, C. A. Meyer, affinis, inflorescentia bracteata, foliisque angustioribus differt.

Caulis erectus, teres, lignosus, glaber; rami plures, virgati, primum pilis longis appressis vestiti. *Folia* alterna, rarius subopposita, sessilia, oblonga vel oblongo-lanceolata, acuta, subtus

sericea, supra glabra vel sparse pilosa, 1·2 cm. longa, 2–3 mm. lata. *Spica* terminalis, elongatus; bracteae calyce breviores. *Calyx* 6–8 mm. longus, carnosus, carneus vel lutescens, basi ovoideus; tubus cylindricus, extus appresse tomentosus; lobi 4, obtusi, 1·5 mm. longi, exteriores ovati, 1 mm. lati, interiores oblongi, 0·75 mm. lati. *Stamina* 8. *Ovarium* ovatum, compressum, coma pilorum alborum rectorum 0·75 mm. longorum terminatum; stylus excentricus. *Fructus* ovoideus, acuminatus, 3 mm. longus.

South Africa. Kalahari Region: Orange River Colony, Besters Vlei near Witzies Hoek, *Bolus* 8243. Transvaal; near Ermelo, *Burtt-Davy* 960, Lydenburg, *Wilms* 1287, 1288. Eastern Region: Griqualand East; by streams near Kokstadt, *Tyson* 1214. Natal; Weenen County, *Wood* 4550, grassy hill near Newcastle, *Wood* 7200, near Charlestown, *Wood* 4802, and without precise locality, *Gerrard* 284.

This species, which grows at altitudes between 1299 and 1834 metres, varies in the length and colour of its calyx and also in the length and amount of the indumentum upon it. No satisfactory line can be drawn between the forms included here, which merit further study in the field. *A. fraternus*, N.E. Br., differs in having opposite leaves and in the absence of bracts.

1544. **Loranthus (Sycophila) subcylindricus,** *Sprague* in Dyer, Fl. Cap. vol. v. sect. 2, p. 103, anglice [Loranthaceae]; affinis *L. Woodii*, Schlechter et Krause, a quo toro subcylindrico discoque distincto recedit.

Folia lanceolata vel oblanceolata, 2·5–7 cm. longa, 0·8–2 cm. lata, margine crispatulo; petiolus 2–6 mm. longus, alatus. *Racemus* rhachi usque ad 2·5 cm. longa; pedicelli 2–4 mm. longi, apice haud vel paullulum obliqui; bractea erecta, ovata, perconcava, 1 mm. longa, dimidio inferiore umbonato. *Torus* subcylindricus, 2 mm. longus vel ultra. *Petala* 0·9–1·2 cm. longa; unguis 2–2·5 mm. longus, 1–1·5 mm. latus, vitta ventrali longitudinali incrassata. *Filamenta* 3·5 mm. longa; antherae 3–4·5 mm. longae, locellis 18–26. *Discus* quadrangularis, styli basin amplectens, cae adnatus vel liber. *Stylus* 7·5–8 mm. longus. *Bacca* oblongo-ellipsoidea.—*L. Woodii*, Schlechter et Krause, in Engl. Jahrb. vol. li. p. 454, partim.

South Africa. Natal: Alexandra District; by the Umtwalumi River, on *Ochna arborea*, Burch., *Rudatis* 904. Zululand: Nkandhla, 1200–1500 m., *Wylie in Herb. Wood* 9013.

1545. **Loranthus (Incrassati) Wyliei,** *Sprague* in Dyer, Fl. Cap. vol. v. sect. 2, p. 110, anglice [Loranthaceae]; affinis *L. Menyharthii*, Engl. et Schinz, a quo foliis minoribus glabris differt; facie *L. quinquenervi*, Hochst., similis, corollae lobis reflexis filamentisque distinguitur.

Rami subteretes, nodosi, cinerei, graciliusculi, circiter 2 mm. diametro 15 cm. infra apicem, glabri; ramuli pilis brevissimis simplicibus minute densiuscule induti; internodia 0·6–1·2 cm. longa. *Folia* alterna, petiolata, oblanceolata vel oblongo-oblanceolata, 1·7–2·7 cm. longa, 0·6–1·1 cm. lata, apice obtusa vel rotundata, in

basin angustata, tenuiter coriacea, glabra, penninervia, nervis utrinque leviter elevatis, iis jugi infimi valde obliquis costae subparallelis; petiolus 1–2 mm. longus, supra minute pilosus. *Fasciculi* axillares, 2-3-flori, vel flores solitarii; pedicelli 1–1·3 mm. longi; bractea cupularis, subtruncata lobo dorsali late ovato, extra minute pilosa, grosse ciliata, infra lobum leviter umbonata, margine dorsali 2·3 mm. longo, margine ventrali 1·5 mm. longo. *Flores* pentameri. *Torus* calycecum anguste cylindricus, 6 mm. longus, 1·3 mm. diametro; torus calyce paullulo latior, glaber. *Calyx* 4 mm. longus, quinquedentatus, ciliatus, ceterum glaber, dentibus triangularibus 0·35 mm. longis. *Corolla* circiter 5 cm. longa, glabra, in alabastro linearis, superne clavata, acuta, parte apicali incrassata circiter 7 mm. longa; tubus ampulla supra-basali inconspicua, supra ampullam per 3 mm. angustissimus, deinde ad apicem sensim expansus; lobi circiter 3 cm. longi, medio reflexi, parte inferiore a basi lata lineari; parte superiore oblanceolato-lineari. *Filamenta* 9 mm. supra basin corollae loborum inserta, parte inferiore erecta filiformi, 8 mm. longa, parte superiore valde incrassata, sub anthesi spiraliter involuta; antherae lineares, fere 4 mm. longae, haud transverse septatae, connectivo truncato. *Discus* acute lobatus. *Stylus* filiformis, stigmate ovoideo 1·3 mm. longo.

South Africa. Zululand: Ngoya, *Wylie in Herb. Wood* 7468.

1546. **Loranthus** (**Tetrameri**) **Galpinii,** *Schinz ex Sprague* in Dyer, Fl. Cap. vol. v. sect. 2, p. 112, anglice [Loranthaceae]; affinis *L. panganensi*, Engl., a quo floribus pentameris distinguitur.

Planta glabra. *Rami* crassiusculi, valde nodosi, griseo-brunnei, densiuscule lenticellati, post lapsum foliorum inflorescentias gerentes, 4–5 mm. diametro; ramuli laeves, brunnei, circiter 3 mm. diametro 15 cm. infra apicem; internodia 0·8-3 cm. longa. *Folia* opposita, petiolata, oblongo-lanceolata, recta vel leviter curvata, 7·5–11 cm. longa, 1–2 cm. lata, apice obtusa vel apiculata, in basin sensim angustata, rigide coriacea, penninervia, nervis lateralibus obliquis, utrinque plus minusve elevatis vel indistinctis, costa manifeste elevata; petiolus 8–10 mm. longus. *Umbellae* axillares, 2-florae, singulae in ramulis, singulae vel geminatae in parte defoliata ramorum; pedunculus crassus, 3–6 mm.longus, parte receptaculari marginata, margine tenui 0·7 mm. lato; pedicelli circiter 2 mm. longi, crassissimi; bractea subcupularis, bilabiatus, labio dorsali erecto 2·5–3 mm. longo rotundato, labio ventrali patulo 0·8 mm. longo truncato. *Flores* pentameri. *Torus* calycecum campanulatus, supra medium valde expansus, 6 mm. longus; torus 3·5 mm. longus, 2·5 mm. diametro. *Calyx* cupularis, truncatus, 2·5–3 mm. longus, 4·5 mm. diametro. *Corolla* lutea, circiter 7·5 cm. longa, in alabastro linearis, superne paullulum clavata; tubus pentagonus, basi haud inflatus, infra medium sensim ad apicem expansus, haud unilateraliter fissus; lobi 4·5 cm. longi, 2·5 mm. lati, linear-oblanceolati, acuti, 5–6 mm. supra basin reflexi. *Stamina* kermesina; filamenta 3 mm. supra basin corollae loborum inserta, erecta, circiter 2 cm. longa,

vix 1 mm. lata; antherae lineares, sursum leviter ampliatae, 1·6 cm. longae, connectivo truncato. *Discus* in toro depressus, pentagonus, 0·8 mm. altus. *Stigma* late ovoideum, 1·5 mm. longum.

South Africa. Transvaal: Kaap River valley, Barberton, on *Sclerocarya caffra*, Sond., *Galpin* 896.

1547. **Loranthus** (**Acranthemum**) **Moorei,** *Sprague* in Dyer Fl. Cap. vol. v. sect. 2, p. 114, anglice [Loranthaceae]; affinis *L. Zeyheri*, Harv., et *L. natalitio*, Meisn., ab hoc foliis glaucis, bractea torum et calycem superante vel aequante, ab illo glabritie facile distinguitur.

Rami, ramuli abbreviati, folia, inflorescentiae glabri. *Folia* glauca. *Umbellae* circiter 6-florae; bractea a basi patelliformi unilateraliter producta, vel foliacea, 0·6–1·2 cm. longa, 1·5–3 mm. lata, vel non foliacea, 3–4 mm. longa, plana, haud carinata. *Torus* calycecum late campanulatus, 2·8 mm. longus. *Calyx* 5-dentatus, 0·25–0·35 mm. longus. *Corolla* 5 cm. longa; tubus basi manifeste inflatus; lobi lineari-lanceolati, 1·5 cm. longi, 1·5 mm. lati. *Filamenta* deflexa, 5 mm. longa; antherae 6 mm. longae. *Discus* calycem 0·8–1 mm. superans. *Stylus* parte incrassata 9 mm. longa.

South Africa. Transvaal: near Barberton, *Moore*.

1548. **Loranthus** (**Acranthemum**) **minor,** *Sprague* in Dyer. Fl. Cap. vol. v. sect. 2, p. 115, anglice [Loranthaceae]; affinis *L. natalitio*, Meisn., a quo ramulis abbreviatis minute puberulis, foliis minoribus minus coriaceis, corolla minore gracillima, disco quam calyce multo breviore, stylo filiformi recedit.

Rami graciles, cinerei vel griseo-brunnei, infra 2 mm. diametro 15 cm. infra apicem, ramulos abbreviatos in axillis foliorum lapsorum gerentes; ramuli pallide brunnei, 1–1·5 mm. diametro; ramuli abbreviati basi inconspicue perulati, minute puberuli, 2–3 paria foliorum gerentes, umbella terminati. *Folia* opposita, petiolata, ovato-lanceolata vel ovata, 1·8–3·1 cm. longa, 0·8–1·2 cm. lata, apice obtusa vel rotundata, basi obtusa vel cuneata, tenuiter coriacea, glabra, paullum supra basin trinervia, nervis inconspicuis; petiolus 1·5–4 mm. longus, gracilis. *Umbellae* 2–5-florae; pedicelli 6–8 mm. longi, graciles; bractea a basi patelliformi unilateraliter producta, 1–1·3 mm. longa, oblonga, valde concava, nonnonquam fere cymbiformis, apice obtusa, rotundata vel truncata, crasse obtuse carinata. *Flores* pentameri. *Torus* calycecum campanulatus, 2·5 mm. longus. *Calyx* 0·5 mm. longus annulo intramarginali incluso, subtruncatus. *Corolla* in alabastro linearis, supra medium latior, superne leviter clavata, acute acuminata, usque ad 5 cm. longa. *Filamenta* 5–6 mm. longa. superne ventraliter incrassata, parte incrassata oblonga 0·8 mm. longa; antherae lineares, 5–7 mm. longae, connectivo rotundato. *Discus* calyce multo brevior. *Stylus* filiformis, stigmate ovoideo fere 1mm longo.—*L. natalitius*, var. *minor*, Harv. in Harv. et Sond. Fl. Cap. vol. ii. p. 576 (errore sub *L. Zeyheri* impressus); Wood, Handb. Fl. Natal, 115.

South Africa. Natal: Mooi River, *Gerrard* 1434; banks of Umtwalumi River, on *Clausena inaequalis*, Benth., *McKen* 1863;

Umzinyati, *Wood* 1320; Alexandra District, Dumisa, *Rudatis* 1120. Zululand: Qudeni Forest, 1800 m., *Davis in Herb. Wood* 8608.

1549. **Loranthus** (**Infundibuliformes**) **Bolusii,** *Sprague* in Dyer, Fl. Cap. vol. v. sect. 2, p. 115, anglice [Loranthaceae]; affinis *L. Lugardii*, N. E. Brown, a quo umbellis breviter pedunculatis, corolla basi inflata differt.

Planta glabra. *Rami* teretes, cinerei, dense lenticellati; ramuli subangulares, brunnei, circiter 1·5 mm. diametro 1·5 cm. infra apicem; internodia 0·8–2·5 cm. longa. *Folia* opposita vel alterna, petiolata, oblongo-lanceolata vel lanceolata, 4–7 cm. longa, 1–1·6 cm. lata, apice minute apiculata vel obtusa, in basin angustata, rigide coriacea, paullum supra basin trinervia, nervis supra leviter elevatis subtus minus obviis; petiolus 3–5 mm. longus. *Umbellae* axillares, solitariae, breviter pedunculatae, 4–5-florae; pedunculus crassus, 1–1·5 mm. longus; pedicelli 1–1·3 mm. longi; bractea cupularis, lobo dorsali deltoideo, margine dorsali 1·5 mm. longo calycem aequante, margine ventrali 1 mm. longo. *Flores* pentameri. *Torus* calycecum turbinatus, 1·8 mm. longus. *Calyx* truncatus, 0·7 mm. longus. *Corolla* 2–2·3 cm. longa; tubus unilateraliter vel irregulariter findens, ampulla suprabasali ellipsoidea 2·5 mm. longa, supra ampullam per 1·5 mm. constricta, deinde ad apicem ampliata; lobi erecti, lineari-spathulati, 1–1·2 cm. longi, 0·7 mm. lati. *Filamenta* 3 mm. supra basin corollae loborum inserta, deflexa, sensim angustata, 5·5 mm. longa; antherae lineares, 1·8 mm. longae. *Discus* pentagonus, haud lobatus, 0·25 mm. altus. *Stylus* filiformis; stigma depresso-globosum, 0·7 mm. diametro.

South Africa. Portuguese East Africa: Delagoa Bay; 18 miles from Lourenço Marques, *Bolus* 9764.

1550. **Viscum** (**Ploionixia**) **pulchellum,** *Sprague* in Dyer, Fl. Cap. vol. v. sect. 2, p. 123, anglice [Loranthaceae]; affinis *V. obovato*, Harv., a quo petalis floris ♀ lanceolato-oblongis torum aequantibus, stylo longiore differt.

Rami subteretes, graciles, infra 2 mm. diametro 1·5 cm. infra apicem; ramuli gracillimi, 1·2–6 cm. longi, subangulati, minute papillati, internodiis 0·5–1·2 cm. longis. *Folia* distincte petiolata, late obovata, apice rotundata vel obtusa, in basin subcuneata, 0·6–1·2 cm. longa, 4–8 mm. lata, coriacea, glabra, obsolete 3-nervia, nitidula; petiolus 1–2 mm. longus. *Inflorescentia* ♂ haud cognita. *Inflorescentia* ♀: Cupulae bracteales axillares, sessiles, solitariae vel geminatae, flores singulos gerentes, distincte bilabiatae, labiis sub angulo recto vel minus divergentibus, 1–1·3 mm. longae, medio 0·5–0·7 mm. altae, margine interiore grosse glanduloso-ciliatae. *Torus* anguste campanulatus, 1·3 mm. longus, 0·8–0·9 mm. diametro. *Petala* lanceolato-oblonga, subacuta, 1·3 mm. longa. *Stylus* cum stigmate 0·8 mm. longus. *Bacca* ellipsoidea, 4 mm. longa, subtiliter verrucosa.

South Africa. Natal: Tugela River, *Gerrard* 1649.

VIII.—THE CARE OF OLD TREES.

W. J. BEAN.

(With Plates.)

The number of inquiries received at Kew as to the best treatment for trees decayed in the trunk, or showing evidences of decline by their poor growth or thin foliage, points to a wide interest in the subject. As a matter of fact there are few gardens or parks of any considerable extent which do not contain trees whose size or rarity, or perhaps associations, give them a peculiar value in their owner's eyes. The longevity of a tree, even if it be of the commonest species, endows it with an individuality of its own and makes it capable of inspiring sentiments and creating memories to which few shrubs and no herbaceous plant can ever lay claim. It is not, therefore, surprising that there is a widespread desire to know how the decreasing vigour of such trees may be revived. There is not the least doubt that the term of years of many trees is shortened by neglect due to ignorance.

The three most powerful agencies that bring about the destruction or decline of trees are wind, failing food supply, and fungoid parasites.

Wind.—As regards storms, the matter, so far as existing large trees are concerned, is to a considerable extent out of one's hands. Trees that suffer most are those whose main trunk forks low down, separating there into two or more great limbs and dividing the head of the tree into several distinct sections. With trees in exposed positions there comes a wind-storm sooner or later that starts a crack in the fork. Moisture, parasitic fungi and decay follow in turn, and eventually one section of the head of the tree comes to the ground. The prevention of the forking of trees is, of course, a matter that should be attended to in the early stages of their growth. Neglected then, it is difficult, or perhaps impossible to remedy afterwards. It is, in fact, the most important item in the management of large-growing trees in their young state, and consists in keeping the tree to a single leader as long as it is reasonably accessible, by suppressing all rivals, thereby laying the foundation of a tall, straight trunk or main axis capable of supporting the whole head of branches. Large trees that are in danger through having been neglected in this respect may be assisted in two ways. They may (1) have the strain on the limbs lessened by reducing the top-growth; and (2) the main limbs may be made to give each other mutual support by being braced together.

The first of these operations is almost entirely a matter of judgment exercised on the spot. Unduly heavy branches may, however, be rendered safe for many years by the use of the saw. The top-growth of prettynearly every tree is capable of being considerably reduced without in the least destroying its shapeliness or characteristic form. It is an operation needing taste and care, and consists chiefly in removing branches either clean back to the limb or back to the place where they join another and perhaps larger branch. Merely stubbing back the branches and leaving stumps must be avoided.

Artificial support of Limbs.—The bracing together of large limbs is done in two ways. The commonest method is by placing a collar of iron round each limb and joining them by a stout chain or iron rod fitted with a screw arrangement for tightening up. This plan is quite efficacious, but the collars need watching. As the limb increases in girth the collar becomes too small, and, if left too long, becomes imbedded in it (*see* Plate I, fig. ii). It is best to make a collar with a hinge, so that it can be adjusted to the increasing girth of the limb; also to move it up or down every five years or so. Another plan equally effective for all but resinous conifers, and practically permanent, has been employed at Kew during the past fifteen years. In this the collar is dispensed with. A hole is bored right through each limb with an auger large enough to admit an iron rod $\frac{3}{4}$ to $1\frac{1}{4}$ ins. thick, "threaded" at each end, which must be long enough to reach from limb to limb and protrude a little beyond the outside of each. It is necessary, of course, that the holes should be on the same alignment. Any slight error in this respect can, however, be overcome by bending the rod. A stout iron plate curved to fit the circumference of the branch is now placed at each end of the iron rod and made to set close to each limb by means of a screw-nut and the whole thus braced together. The weight of each limb is thereby supported by the iron plate instead of a collar (*see* Plate I, fig. i). If, in course of time, the wood should close over the plate no harm would be done, rather the reverse. The iron rod should fit the auger-hole as closely as possible, and it should be heavily smeared with coal tar before it is thrust through the limb—the object being to make the opening air- and water-tight. This plan has been adopted for a good number of insecure limbs of trees in Kew, such as beeches, Sophoras, oaks and Crataegus: in no case have any evil effects been noticed. It has not been employed for resinous trees for fear of persistent bleeding. Some people regard the boring of the auger-hole right through the heart of the limb as a barbarous proceeding. But anyone acquainted with the elementary characteristics of tree-growth knows that it is not so. The vital processes connected with growth and the deposit of new wood are located just beneath the bark. A tightly clasping collar is much more likely to interfere with them than a cleanly bored hole. Practically the only disadvantage the latter involves is a slight reduction of the resisting power of the limb to external strain at that particular part.

Watering and Feeding the Roots.—Long spells of excessive drought undoubtedly hasten the end of many trees that have reached their period of decline. This was very evident to dwellers in the lower Thames Valley by the great number of dead trees that could be seen in hedgerows and elsewhere during the succession of dry summers about twenty years ago. When an artificial supply of water is available, rare or valuable trees can be greatly helped by employing one or other of the various "sprinklers" which distribute the water in the form of rain. To effect any real benefit the soil should be thoroughly moistened all through, and, for a big tree, the water should run for at least twenty-four hours, or, still better, two or three days. It is remarkable, nevertheless, how much less effective artificial watering is

than the natural rainfall. During a hot, dry spell, evaporation is so great that one may apply water to the roots of a tree in quantities equivalent to what it would receive from the entire rainfall of a wet summer, and yet the process will bear repeating in a few weeks. Few trees are more benefited by a generous water supply than conifers of the *Cupressinae* group (*Thuya*, *Cupressus*, etc.). The cypresses at Kew have for several years past been given liberal supplies of water by means of irrigators or "sprinklers" in the early summer without regard to the natural rainfall, and the result has been a remarkable improvement in their vigour. It has also had the effect of staying the attacks of a scale insect that was proving very troublesome. Old cedars growing on light soils also derive much benefit from copious waterings during dry spells.

Mulching.—The majority of places, however, have no water supply of a kind that can be utilised for the watering of trees to this extent. The alternative method then is mulching or "top-dressing." On the whole, this is more permanently effective than artificial watering, but is difficult to adopt for trees situated on lawns, as are so many notable trees. There is no doubt that cultivating the area of soil occupied by the roots of a tree, *i.e.*, keeping the surface open, loose and free from weeds or grass is extremely beneficial; and for trees giving indications of starvation at the roots a mulching of four to six inches of decayed leaves, loam, farmyard manure, or a mixture of these, will be found of great additional benefit. On surface-rooting trees like beech and horsechestnut the invigorating effects of such a top-dressing are remarkably evident, even during the first season.

In the case of trees whose branches do not reach the earth, the disfigurement to a trimly-kept lawn of a large patch of bare or mulched ground would prevent many people adopting the surface-cultivating process. At Kew, where many valued trees with clean, exposed trunks are growing on shaved lawns, a sort of compromise is adopted. About the time of the fall of the leaf, the turf is taken off and used elsewhere to repair worn patches caused by the summer's traffic. The bared surface is then pricked over with a fork as deeply as can be done without injuring the roots and a four-inch dressing of manure put on the top. The ground is then left exposed to rain and frost until the following April, when the manure is forked in and the ground trodden down and sown with grass seed. Without placing too implicit a reliance on the stories of the wonderful, but very elusive, "poison" supposed to be emitted by the roots of grasses—there are tens of thousands of magnificent trees growing in parks and on lawns that manage to survive it—there is no doubt that the growth of grass is very detrimental indeed to the progress of young trees. This has been known to generations of cultivators. In my opinion it is entirely due to the reduced aeration of the soil, and to the grass absorbing the rainfall and preventing its reaching the tree roots at the season, early summer, when they most need it. In a place like Kew especially, where some of the lawns have been undisturbed for decades and in the meantime trodden by innumerable feet, the soil has become very consolidated for two or three inches at the top. In such places, when once the ground becomes dry in summer, it

takes a heavy and continuous fall of rain to penetrate to the roots again. After a dry period I have frequently noticed that even a day's persistent rain will not penetrate more than two or three inches below the surface on some of our lawns. It is evident enough, therefore, how a failing tree may be benefited by having the hard surface soil broken up, even if the turf be relaid. Still more if it can be kept permanently open and cultivated.

Parasitic Fungi.—Probably neither storms nor root-starvation hasten the end of trees so much as parasitic fungi. It is often their attacks that fatally reduce the wind-resisting power of trees. In its bark the tree is endowed by nature with an armour capable of resisting fungoid attack. But this armour is often pierced by breakages, by insects and, in gardens, through bad pruning. Cultivators who especially treasure a particular tree should see that its "skin" is maintained whole. Whenever a wound appears measures should be taken to heal it. The most vulnerable part of a tree, of course, is its trunk, then its main limbs. The outer extremities do not matter so much, although it is often possible for disease to start there and gradually creep inwards to the main limbs and trunk.

In travelling about the country it is evident to any one who has any knowledge of this matter, that the most common cause of decay is due to neglect of snags. Hollow trunks, or decayed cavities have invariably their origin in neglected stumps left by branches being broken off by wind, or to that curious propensity many people who prune off branches have to leave stumps a few inches long, instead of sawing them clean back to the trunk or limb from which they spring (*see* Plate II, fig. iii).

It may be stated as an axiom that when a branch has to be removed, or when the stump of a branch is left through breakage by wind, it must be cut right back to, and in line with, the circumference of the trunk or larger branch to which it has been attached. The new bark which it should be one's aim to encourage to grew over the wound and thus make it secure against decay, will do its work most quickly when no stump is left. A stump may sometimes be left short enough for the new bark to grow over it, but, if more than an inch or two long (according to the size of the trunk) the bark will never cover the wound, decay sooner or later is set up, damp enters, and a cavity begins to form. After a while this will become large enough to hold water and then, as one may imagine, decay is doubly rapid.

Even when the amputation has been done in the best way, the raw surface of the wound is still a source of danger as the landing-place for the spores of parasitic fungi. Especially is this the case with soft woods like lime and horsechestnut. The best preventive is a good coating of ordinary coal tar applied at once. This substance forms an air-tight and water-tight covering and effectually disposes of any danger from fungi. The wound should be examined again a few months after it has been made, and if necessary a fresh coat of tar put on. Wounds sometimes crack through summer heat, and the openings should be filled in with tar and made water-tight. The tar, in fact, acts as a temporary bark until the new bark extends over the wound, and it should be

renewed as often as may be necessary until that is accomplished. This applies to all wounds on trees, however caused.

There still remains to be considered the treatment of cavities that have been allowed to form. As a matter of fact, in very few of the cases we are asked to advise upon is it prevention of decay that is in question. Almost invariably it is how to deal with trouble already in existence and due to neglect.

No treatment will ever enable a tree to fill up a cavity with sound wood. All that can be done is to arrest the mischief and prevent, if possible, further decay.

The first thing is to clean out thoroughly all the decayed wood (often reduced to a sodden mass) from the cavities. If possible it should be cleaned out right back to the hard wood; if the wood be sound it does not matter if it be dead. Very frequently, in long neglected wounds, a deep, narrow, well-like cavity has formed by decay, which it is impossible to get thoroughly clean and dry by working from the top. In this case, the best plan is to find by poking with a piece of stout wire how deep down the trunk the cavity extends. Then an auger-hole should be bored from the outside in a slanting direction upwards so as to reach the bottom of the hole thus located. This will enable all the moisture, etc., to drain out. When the walls of the cavity are reasonably dry (it may take a few days for them to become so, but there is no need to hurry) they should be washed with a solution of carbolic acid. This solution is made by adding one part of "commercial" carbolic acid (liquid) to twenty parts of methylated spirits. This is intended to penetrate into the walls of the cavity and kill any fungoid growth that may remain. It soon dries and the wood must then be coated over with a generous layer of coal tar. It now remains to fill up the hole and make it water-tight. On the whole we have found Portland cement the most convenient "stopping," although asphalt has been recommended. Where the hole is large, cement is apt to crack, and may thus require looking to occasionally. The cement, or whatever stopping is used, should not be allowed to fill up the cavity so as to close in the roll of new bark which will, if the stump be a short one, nearly always be found there. (If the stump be a long one, it must be sawn off close, as advised above.) This roll of new bark represents the attempt of the tree to close up the cavity. It has not succeeded because the new bark has lacked a surface on which to set itself, such as would have been provided by the sawn surface of the wound had it been protected from decay, and such as is now provided by the cement. The hole, therefore, should only be filled up sufficiently to reach the lower side of the roll (*see* Plate II, fig. iv). The tree is thereby enabled to lay its new bark and wood over the cement, and eventually to hermetically seal up the old opening of the cavity.

Where the hole is very large the aid of the bricklayer may be obtained. In the *Kew Bulletin* of 1912, p. 338, two illustrations of the building up of such a hollow by bricks and mortar are given. These and the accompanying text may be consulted.

Fungi on Roots.—The attacks of fungi on roots are the most subtle and deadly of all. As a rule the damage is beyond remedy before it is discovered. Fortunately it is rare in comparison with

PLATE I.

I.

II.

To face page 86.

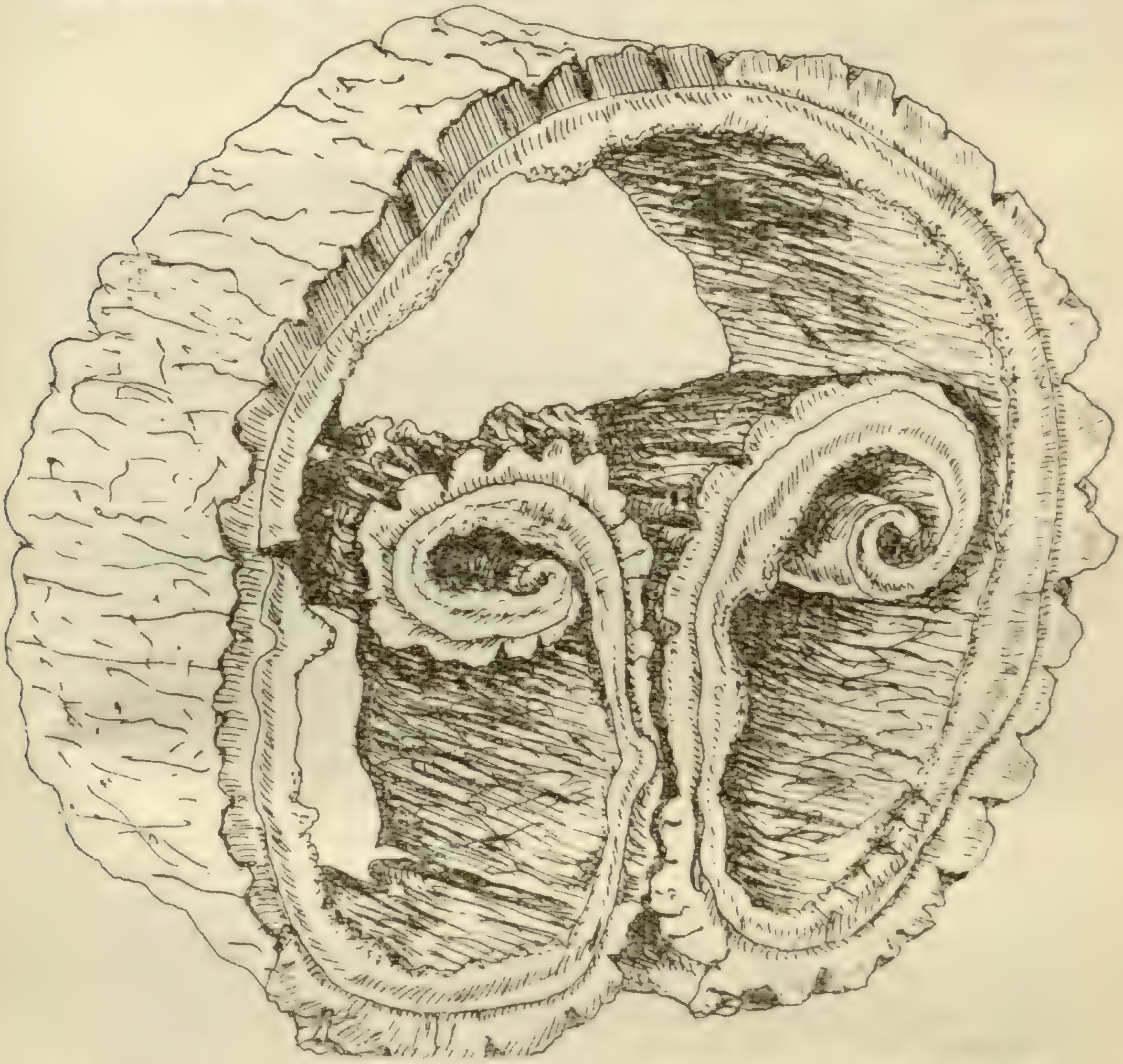
PLATE II.

III.

IV.

To face page 87.]

stem and branch disease. The only practical advice that can be given now is that all roots severed or barked during ground work near trees should have the wounds coated with coal tar as advised for branch wounds.



Portion of an Elm trunk from Elveden Park, Suffolk, now in Museum IV. Kew. This is a very remarkable example of the persistency of a tree trying to close up a cavity in its trunk by the continued formation of new bark. It shows the necessity of assisting a tree to close up a wound by providing it with a solid surface on which its new bark can be laid.

EXPLANATION OF PLATES.

Plate I.

Fig. I.—*Sophora japonica* (one of the original trees at Kew introduced in 1753). The limbs are supported together by iron rods and plates as described in the text. Lower down on the central limb is a constriction caused by allowing an iron collar to remain too long in one place.

Fig. II.—Portion of the limb of a tree preserved in Museum IV. at Kew, showing the result of neglecting a supporting iron collar. Not only has the collar itself become embedded, but also a link of the chain to which it was attached.

Plate II.

Fig. III.—A neglected wound on a walnut tree. Here is very clearly shown the evil of leaving a stump when pruning, instead of cutting it close back as advised in the text. The tree, as may be seen from the roll of

new bark all round the wound, has made an attempt to close up the wound, but failed on account of the stump several inches long being left.

Fig. IV.—The same, after being cleaned out, antiseptically treated and filled with Portland cement. It is interesting as showing the correct amount of "stopping" to use. The cement should only come up to the *lower* side of the roll of new bark which is now provided with a surface over which it may extend.

IX.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS LXXXIV.

831. **Eriolaena Lushingtonii,** *Dunn* [Sterculiaceae Eriolaeneae]; *E. quinqueloculari*, Wight, affinis, foliis membranaceis, alabastris medio constrictis distincta.

Arbor, partibus herbaceis stellato-pubescentibus. *Folia* orbicularia, cordata, acuta, 4–5 cm. longa, irregulariter breviter dentata, supra pilis stellatis conspersa, infra albo-vestita, petiolis lamina bis vel ter brevioribus. *Flores* pedunculis axillaribus longis 2–3-floris gesti; bracteolae in filamenta tomentosa multa fissae, 4–5 mm. longae, caducae, distantes et ad gemmas maturas haud accedentes. *Sepala* 5, basi connata, ligulata, 2 cm. longa, intus pubescentia, extra tomentosa. *Petala* 5, decidua, anguste obovata, unguibus tomentosis dilatatis exceptis glabra. *Columna staminalis* versus apicem in series paucas filamentorum fertilium divisa; antherae erectae, lineares. *Staminodia* 0. *Ovarium* sessile, circiter 7-loculare; loculi multi-ovulati; stylus simplex, apice in stigmata 7 parva divisus. *Capsula* lignosa, ovata, breviter acuminata, loculicide dehiscens. *Semina* loculo quoque 5–8, adscendentia, superne in alam producta.

India. Madras Presidency, Nallamalais, Cheloena (Kurnool District), *A. W. Lushington.*

832. **Indigofera polygaloides,** *Scott* [Leguminosae Galegeae]; ab *I. trita*, Linn. f., habitu graciliore, racemis longissimis tenuoribus nunquam foliis brevioribus, indumento minus denso recedit.

Herba gracilis, 40–50 cm. alta; caules plures, adscendentes, superne quadrangulares, appresse albido-hirsuti, basi fusco-brunnei ceterum pallido-virides. *Folia* petiolo 5–8 mm. longo gracillimo hirsuto suffulta, trifoliolata; foliola oblongo-elliptica, basi apiceque obtusa, brevissime mucronulata, utrinque pilis medifixis brevibus circiter 0·5 mm. longis albis induta, costa supra depressa subtus prominenter elevata pilis albis dense induta, nervis lateralibus supra subdistinctis subtus obscuris; foliola terminalia 2–2·7 cm. longa, 5·5–7 mm. lata, petiolulo 5–7 mm. longo suffulta, lateralia 1·4–1·9 cm. longa, 4–5·5 mm. lata, petiolulis 1 mm. longis; stipulae lineares, 1·5–2 mm. longae, pilosae. *Racemi* axillares, 7–13 cm. longi, multiflori; rhachis pilis minutissimis albidis induta; bracteae minutae, 1·5 mm. longae, pilosae, sub anthesi deciduae; pedicelli ad 1 mm. longi, pilis albis

appressis induti. *Calyx* dense albido-pilosus; tubus 1 mm. altus: lobi lineares, acutissimi, 2·5 mm. longi. *Vexillum* sessile, ovatum, apice rotundatum, 5 mm. longum, 3·5 mm. latum, extra breviter albo-pubescens; alae lanceolatae, apice rotundatae, 4·5 mm. longae, 1·5 mm. latae; carina oblonga, apice rotundata, 4·5 mm. longa, 2 mm. lata, appendicibus lateralibus subulato-lanceolatis curvatis 1 mm. longis instructa. *Stamina* fere 3·3 mm. longa; antherae fere 0·5 mm. longae, apice glandulo subulato minutissimo albido ornatae. *Legumen* juvenile sessile, lineare, 1·5–2 mm. longum, fere 1 mm. latum, apice stylum persistentem gerens, dense breviter villosum. *Semina* multa, orbicularia.

North Australia. Pine Creek: near Darwin, Feb. *C. E. F. Allen* 85.

833. **Dolichos errabundus,** *Scott* [Leguminosae–Phaseoleae]: a *D. falcato*, Klein, foliolo medio haud triloboto, inflorescentia longiore, floribus in inflorescentiae ramis singulis recedit, et a *D. bifloro*, L., caule foliisque minus pubescentibus, et floribus distincte pedunculatis distinguendus.

Herba errabunda, semiprostrata, caule angulato leviter albo-pubescente. *Folia* petiolo 1–2 cm. longo albido-pubescente suffulta, trifoliolata; foliolum medium ovatum, apice subacutum, basi subcuneatum, petiolulo 9 mm. longo piloso stipellato stipellis 2 lanceolatis 1 mm. longis 1·5–2 mm. infra basin folioli positis suffultum; foliola lateralia oblique oblongo-ovata, subacuta vel obtusa, petiolulo 1–2 mm. longo suffulta; omnia costa nervisque pagina superiore subdistinctis pagina inferiore elevatis prominentibus pallidis distinctissimis ut marginibus pilis paucis albidis indutis; stipulae lanceolatae, acutae, fere 4 mm. longae, striatae, pubescentes, persistentes. *Inflorescentia* terminalis, elongata, efoliata, 15–35 cm. longa, pauciflora, internodiis 6–8 cm. longis; flores pauci, magni, pedunculis unifloris 1–2 cm. longis pilis albidis indutis; pedicellus dense pubescens, 0·5–2 mm. longus; bracteolae magnae, ovatae, 5·5–6 mm. longae, 3·5–4 mm. latae, pubescentes, virides, venis parallelis fusco-rubris. *Calyx* campanulatus, dense pubescens; lobi ad 2 mm. longi. *Corolla* glabra; vexillum obcordatum, 1·4–1·6 cm. longum, 1·4–1·7 cm. latum, ungue fere 2 mm. longo apice utrinque auriculato; alae oblique oblongae, apice rotundatae, 1·5–1·7 cm. longae, 6·5 mm. latae, ungue 2–3 mm. longo; carina oblique oblonga, apice rotundata, 1·35–1·5 cm. longa, 6–7 mm. lata, ungue fere 3 mm. longo. *Stamina* 1·6 cm. longa; filamenta tenuissima et subtranslucentia; antherae ovoideae, 1·5 mm. longae. *Stylus* glaber, paullo stamina superans; stigma minutum.

North Australia. Bachelor Farm: near Darwin, Dec. *C. E. F. Allen* 5.

C. E. F. Allen 52 is a form of the same species, but apparently from having grown in a somewhat different habitat its leaves are smaller and more obtuse; the inflorescence and flowers, however, are identical with those of the type.

834. **Rosa (Systylae) cerasocarpa,** *Rolfe*; a *R. longicuspidi*, Bert., foliolis paucioribus et majoribus, sepalis angustioribus et fructibus minoribus differt.

Frutex scandens vel subscandens, alta. *Rami* glauci vel subglauci, aculeis validis recurvis basi late dilatatis sparse armati. *Folia* 12–18cm. longa, 5-foliolata vel rarissime 3-foliolata; rhachis breviter glandulosa et sparse aculeata; foliola breviter petiolata, ovata vel elliptico-ovata, acuminata, argute serrata, glabra vel subglabra, subcoriacea, subtus glaucescentia, venis prominentibus, 5–10 cm. longa, 2·5–5 cm. lata; stipulae adnatae, angustissimae, apice liberae, divergentes et acuminatae, marginibus sparse glandulosis. *Flores* 2·5–3 cm. diametro, in cymas terminales corymbiformes 8–15cm. diametro et multifloras dispositi; pedicelli 2–4 cm. longi, crebre glandulosi. *Receptaculum* anguste obovoideum, 4 mm. longum, villosum et glandulosum. *Calycis* lobi oblongo-lanceolati, acuminati vel caudato-acuminati, pubescentes et glandulosi, interdum pinnatisecti, 7–8 mm. longi, reflexi. *Petala* cuneato-obcordata, alba, circiter 1·2 cm. longa. *Filamenta* glabra, 7–8 mm. longa. *Carpella* copiose villosa; styli in columnam connati, 6 mm. longi. *Fructus* globosus, saturate ruber, circiter 1 cm. longus, calycis lobis et stylis deciduis.

China. Ichang, *A. Henry* 2952; North Patung, *A. Henry* 7007.

Flowered in the collection of Sir W. T. Thiselton-Dyer, K.C.M.G., The Ferns, Witcombe, Glos., in June, 1914, when flowering specimens were sent for determination, with the information that the plant was obtained from China through Sir Thomas Hanbury, La Mortola. Fruits were sent in the following November. It is allied to *R. Sinowilsoni*, Hemsl., and the Indian *R. longicuspis*, Bert., but is readily distinguished by its smaller more numerous fruits, narrower sepals, and the larger fewer leaflets.

835. **Centratherum burmanicum,** *Gamble* [Compositae-Vernonieae]; ab omnibus speciebus Peninsulae Occidentalis foliis majoribus infra viridibus, bracteis exterioribus longis aristatis, interioribus obtusis scariosis differt.

Herba perennis, ad 1 m. alta, ramosa, ramis striatis sparsim hispidis, internodiis 5–10 cm. longis. *Folia* sessilia, lanceolata, apice et basi longe acuminata, 15–20 cm. longa, 5–6 cm. lata, marginibus basi excepta serratis, pagina utraque parce scabride hispida; nervi utrinque 10–12; reticulatio haud conspicua. *Capitula* axillaria vel terminalia, singula vel raro ad 3 in pedunculo communi ad 10 cm. longo, circa 2 cm. diametro; bracteae exteriores multae, virides, lineares, apicibus recurvatis aristatis, ad 1 cm. longae, interiores breviores, scariosae, cuneatae, apicibus obtusis triangularibus dentatis purpureo-striatis. *Corolla* tubularis, 7–8 mm. longa, inferne hyalina, ad tertiam partem fissa, lobis nigro-purpureis. *Antherae* paullo exsertae, supra acutae, infra obtusissime auriculatae. *Styli* graciles, lineares, exserti. *Achaenia* oblonga vel obovoidea, apice truncata, conspicue 10-costata; pappus brevissimus, caducissimus, scaber.

Burma. Southern Shan States: Taunggyi Reserve; in high grass on limestone at about 1500 m., *W. A. Robertson* 434.

836. **Stylidium induratum,** *Scott* [Stylidiaceae]; a *S. bulbi-*

fero, Benth., habitu compactiore, foliis brevioribus carnosioribusque, et floribus minoribus differt, et a *S. Dielsiano*, E. Pritzel, foliis costa subtus crassa et prominente, et floribus minus glanduloso-pubescentibus facile distinguendum.

Planta perennis, 5–7 cm. alta, valde et divaricate ramosa, repens, radicibus 7–11 cm. longis. *Caules* veteres 1–4 cm. longi, nudi, glabri, atri, cortice atro interdum unilateraliter fisso et caduco, bulbis defoliatis incrassatis fuscis; juveniles 1–1·5 cm. longi, straminei, glabri, folia pauca gerentes. *Folia* rosulata, plerumque 9–12 conferta, paucis caducis inter bulbos dispositis, linearia, sessilia, basi gibboso-incrassata, bulbum pallidum demum fuscum vel atrum formantia, apice acuta, 4·5 mm. longa, 0·75 mm. lata, carnosa, subteretia vel triquetra, glaberrima, marginibus indurato-incrassatis albis dentibus minimis levissime serrata; costa subtus versus apicem conspicua, incrassata, indurata, apice mucronem subulatum, 0·5–1 mm. longum formans. *Rhachis* fusca, leviter glanduloso-pubescens, 0·8–1·5 cm. longa, flores 3–6 gerens. *Flores* subsessiles vel pedicellis 1 mm. longis suffulti; bracteae 1 mm. longae. *Calyx* 5·5 mm. longus, levissime glandulosus; tubus fuscus; lobi 1–1·25 mm. longi, lanceolati, obtusi, fere aequales sed duo fere ad apicem connati, tubo pallidiores. *Corollae* tubus 5–6 mm. longus, calycis lobos superans; lobi lanceolati, obtusi, eglandulosi, omnes fere aequales, 3–5 mm. longi, 1 mm. lati; labellum parvum, tenue, basi appendicibus 2 labello paulum longioribus flexuoso-subulatis instructum. *Columna* tenella; antherae ovatae.

West Australia. Victoria Desert: Camp 54, Sept. *R. Helms* (Elder Exploring Expedition).

8·37. **Stylidium Stowardii,** *Scott* [Stylidiaceae]; a *S. brevi-scapo*, R. Br., inflorescentia glandulosa differt, et a *S. Dielsiano*, E. Pritzel, foliis teretibus carnosisque, bulbis atris nec pallidis, labello inappendiculato facile distinguendum.

Planta perennis, parva, repens, 4–6 cm. alta, valde et divaricate ramosa, radicibus fere 8 cm. longis. *Caules* veteres 2 cm. longi, atri, nudi, glabri, bulbis defoliatis incrassatis atris; iuveniles conferti, 1–2 cm. longi, rubri, glabri. *Folia* rosulata, plerumque 9–12 conferta, pauca caduca inter bulbos disposita, linearia, basi dilatata vaginis incrassatis demum rubris bulbos atros formantibus, apice acuta et minute apiculata, 5 mm. longa, 0·75 mm. lata, carnosa, rugosa, teretia, glaberrima, sessilia. *Inflorescentiae* rhachis rubra, leviter glanduloso-pubescens, 1–2 cm. longa, flores 3–6 gerens. *Flores* plus minusve glandulosi, pedicellis 2–4 mm. longis suffulti; bracteae 2 mm. longae, leviter tomentosae. *Calyx* 5 mm. longus, glandulosus: tubus leviter obliquus, ruber; lobi 1–1·5 mm. longi, lineari-lanceolati, obtusi, paulum inaequales. *Corollae* tubus 6 mm. longus, tenuis; lobi glandulis paucis induti, valde inaequales, albi, fauce rubro-maculati; antici oblique oblongo-obovati, 3·5–4 mm. longi, 1·5 mm. lati, postici obovati, 1·5 mm. longi, 1 mm. lati; faux nuda; labellum ovato-orbiculare, minutum, 0·5 mm. diametro, inappendiculatum, carnosum, rubrum. *Columna* tenella; antherae ovatae, fere 1 mm. longae.

West Australia. Nangeenan, *Steward* 121; between Perth and Coolgardie, Railway between Cunderdin and Dedari, *Thiselton-Dyer* 87.

838. **Gnetum Kingianum,** *Gamble* [Gnetaceae]; *G. funiculari*, Blume, affinis, sed foliis siccitate nigris, reticulatione minus areolata et fructibus obtusis differt.

Frutex magnus, scandens, cortice brunneo lenticellato ad nodos multum incrassato; ramuli modice crassi, conspicue lenticellati. *Folia* elliptica vel elliptico-ovata vel ovato-oblonga, apice breviter abrupte cuspidato-acuminata, basi angustata vel rotundata, 10-20cm. longa, 6-12cm. lata, coriacea, pagina utraque siccitate nigra, superiore lucida; costa crassa, supra impressa, infra prominens; nervi utrinque 8-10, paulo prominentes, primum fere recti, marginem versus arcuatim juncti; reticulatio irregularis, conspicua; petiolus crassus, supra canaliculatus, circa 0·8-1·5 cm. longus. *Spicae* ♂ cylindricae, apice acutae, 2 cm. longae, in paniculis ad ramulorum nodos fasciculatis; pedunculi paulo complanati, bracteis duabus acutis ad medium et etiam infra spicam instructi: bracteae cupulares arcte connexae, intra pilis mollibus brevibus septatis ornatae. *Perianthium* elongatum, clavatum, quadrangulum. *Filamentum* breve, crassum, antherarum thecis globosis. *Spicae* ♀ 10-12 cm. longae, paniculatae, solitariae vel 2, e ramulorum vetustiorum nodis ortae; pedunculi circa 1·5 cm. longi; bracteae connatae; bracteae cupulares ut in spicis masculis. *Ovulum* ovatum, longe acutum. *Fructus* in spicas ad 20 cm. longas paniculatas solitarias vel e ramulis vetustioribus fasciculatas dispositi, ellipsoidei, aliquando primum apice paulo acuti, tum apice et basi obtusi, 2-2·5 cm. longi, 1·5-1·7 cm. diametro, vivi flavescentes vel rufescentes, siccitate nigri et reticulati; pedunculi lenticellati.

Malay Peninsula. Perak: Kota Larut, *Wray* 2851; Gunong Batu Patch, 1000 m., etc., *Wray* 917, 1641, 1966, 2993; in forest in various places up to 600 m., *King's Collector* 4031, 4893, 4942, 6699, 10,954. Negri Sembilan: Bukit Danar, *Cantley* 607. Malacca: Selandor, *Cantley* 471. Singapore, *Ridley* 4918, 8074, 9126, *Goodenough* 1612.

839. **Gnetum Wrayi,** *Gamble* [Gnetaceae]; a speciebus aliis malayanis foliis conspicue reticulatis, fructu ellipsoideo-oblongo 6 cm. longo conspicue maculato differt.

Frutex alte scandens, cortice brunneo lenticellis pallidis conspicuis notato; ramuli graciles, teretes, internodiis 4-6 cm. longis. *Folia* elliptica vel elliptico-ovata, apice plerumque abrupte caudato-acuminata, basi rotundata vel attenuata, 7-12 cm. longa, 3-5 cm. lata, coriacea, supra lucida, infra lucida et reticulata, costa conspicua supra impressa; nervi utrinque circa 10, obscuri, intra marginem arcuatim juncti, reticulatione minute areolata; petiolus 6-7 mm. longus. *Spicae* ♂ per paria e nodis ramulorum superiorum efoliosis ortae, cylindricae, 1·5-2 cm. longae; pedunculi paris utriusque inaequales, superioris 7 mm., inferioris 4 mm. longi; bracteae ovatae, acutae, connatae; bracteae cupulares patelliformes, marginibus integrae vel paulo crenatae, intra pilis

mollibus minute septatis ornatae, et flores ♂ et incompletos ♀ mixtos gerentes. *Perianthium* gracile, tubulosum, 1–1·5 mm. longum. *Stamen* longe exsertum, filamento gracili, antherarum thecis oblongis parallelis. *Flores* ♀ incompleti, oblongi, apice obtusi. *Spicae* ♀ etiam e nodis foliosis ortae, 3 cm. longae; verticilli distantes; bracteae cupulares patelliformes, basi inflexae, ut in ♂ pilis mollibus ornatae. *Ovula* ovoidea. *Fructus* sessilis, ellipsoideo-oblongus, utrinque angustatus, 6 cm. longus, pallide brunneus, maculis pallide lutescentibus ornatus.—*G. edule*, Ridley in Journ. Str. Br. Roy. As. Soc., No. 60, p. 64, *non* Blume.

Malay Peninsula. Pahang: Tahan river, *Ridley* 2329. Perak: Thaiping, Relan Tujor and Simpang, *Wray* 603, 1848, 2229, 3009; Larut, *King's Collector* 5283, 6590. Singapore, *King's Collector* 1237, *Ridley* 3958, 6126, *Hullett* 603.

840. **Digitaria orthostachya,** *Stapf et Jesson* [Gramineae-Paniceae]; inter species australienses et malayanas nulli arcte affinis, sed *D. monodactylae*, Stapf, habitu similis praecipue racemis solitariis, sed ab ea culmis annuis, racemis compositis et spiculis longius pedicellatis minoribusque, pedunculis pilosis differt.

Gramen annuum. *Culmi* tenues, teretes, erecti vel basi geniculati et ibi ramosi, 15–18 cm. longi, glabri, 3–4-nodi. *Foliorum vaginae* laxae, firmae, prominenter striatae, rufae, breviter hispidulae, ceterum praeter basin et partem superiorem subglabrae, omnibus nodis parce hirsutis; ligulae breves, membranaceae, minutissime ciliolatae; laminae lineares, superne tenuiter attenuatae, 2·5–9 cm. longae, usque ad 3 mm. latae, rigidulae, utrinque pilis tenuibus albidis rigidis raris instructae, costa prominula, nervis lateralibus multis tenuibus. *Racemi* compositi, spiciformes, solitarii; pedunculi pilis patentibus longis conspersi; rhachis gracilis, subflexuosa, triquetra, glabra; pedicelli graciles, pubescentes, ramosi, inferne plerumque 4-nati, 4–8 mm. longi, superne 2-nati, 3–4 mm. longi. *Spiculae* ovato-lanceolatae, cum callo obscuro 2 mm. longae, pilis adpressis sericeis albisque. *Gluma* inferior 0, superior lanceolata, 1 mm. longa, membranacea, subacuta vel subobtusa, 3-nervis, dorso ubique dense pilosa, pilis usque ad $\frac{1}{2}$ mm. longis acutis. *Anthoecium* inferius vacuum: valva submembranacea, lineare-oblonga, 2 mm. longa, acuta, 7-nervis, dorso ad latera dense sericeo-pilosa parte media glabra; valvula minutissima, papillosa, obscure 2-nervis; anthoecium superius ♂: valva subchartacea, brunnescens, oblongo-lanceolata, subacuminata, ad margines late inflexa, tenuior, 2 mm. longa, 3-nervis, valvula valvae fere aequilonga, 2-nervis, flexuris basi sese obtegentibus. *Antherae* 1 mm. longae. *Styli* 1 mm. longi. *Stigmata* 0·5 mm. longa, lividia. *Caryopsis* ignota.

North Australia. Near Darwin: Bachelor Farm; grassy high land, *C. E. F. Allen* 29, Jan. 1914; near Darwin, grass in rocky land, *C. E. F. Allen* 143, March, 1914.

X.—MISCELLANEOUS NOTES.

Mr. George Brown Mould, a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for India in Council, on the recommendation of Kew, a probationer gardener for service in India.

William Barbey.—Botany has suffered a serious loss by the death of William Barbey which occurred on November 19, 1914. He was a member of a Swiss family which had been settled in Canton Vaud since the early years of the 15th century; his father however, spent many years in New York, where all the children except William were born. He, the youngest of the six, was born at Genthod, near Geneva, on July 14, 1842. His father was an austere man, and the Spartan training which young William received nearly broke him physically and left its mark on his character in many ways. Up to his twentieth year he was educated at Geneva. After that he went to Paris to study engineering at the École Centrale, but illness compelled him to abandon his studies in 1864. For two years he stayed with relations at Havre, and then being sufficiently recovered, he joined an elder brother in business in New York. Once more sickness threw him out of the career he had chosen, and, after a long sea voyage which restored his health, he paid a visit to his native land, and there formed the connection which decided the course of his life.

Agénor Boissier had been his schoolfellow at Geneva, and Barbey now became acquainted with Agénor's brother Edmund, the botanist, into whose circle he was drawn, and it was not long before intimate ties united him with the family, for in 1869 he married Edmund's daughter Caroline. Boissier initiated Barbey into botany, and it was he who instilled into him that taste for field work and for experimental gardening which animated him throughout the rest of his life.

The field of Boissier's activity concerned two great sections of the Mediterranean region—Southern Spain and the "Orient." Barbey's work just touched the West—he translated Hooker's letters* on Morocco and published (together with Burnat) "Notes sur un voyage dans les iles Baléares" (1882). His main work formed a connection with and a development of the "Flora Orientalis," as is indicated by the titles of such publications as "Herborisations au Levant" (1882), "Lydie, Lycie, Carie" (1890), "Samos" (1893), "Karpathos" (1895), "Sertum Cerigense" (1897). The publication of his "Florae Sardoae Compendium" (1884) and his share in the "Florae Libycae Prodromus" (1910) also bridged to some extent the wide gap between the principal domains of Boissier's life work.

Barbey went twice to the Orient; in 1873 he travelled through Greece to Smyrna, Constantinople and the Bithynian Olympus, and in 1880 he visited Egypt, Palestine, Western Syria and Cyprus. In order to supplement the material collected on his

---

* In Proceed. R. Geogr. Soc. London (1871) xv, pp. 212–221.

own journeys he frequently employed collectors in the East, among whom may be mentioned Adolf Pichler in Karpathos, Lycia and Cyprus, the noted palaeontologist C. T. Forsyth Major in Karpathos, Samos, and other islands of the Aegean Sea, and Philipp Taubert in the Cyrenaica. He also furthered the botanical exploration of the Orient with financial assistance and opened the pages of the "Bulletin de l'Herbier Boissier" to papers on the Oriental flora. A number of articles, mainly plant lists of certain Aegean islands, published in the Bulletin were the result of the joint work of Barbey and Major, whilst the fruits of Taubert's expedition were incorporated in that fine work "Florae Libycae Prodromus," which was begun by Barbey in co-operation with Ascherson and finished by Durand and Baratte, with Barbey still acting as co-editor.

In 1871 Barbey began a monograph of the genus *Epilobium*, for the illustration of which he secured the services of Ch. Cuisin. The publication of the work was delayed from year to year until Barbey, in 1884, saw himself forestalled by the appearance of Haussknecht's monograph. Fortunately 24 beautiful plates were ready and, accompanied by a short diagnostic text, they were issued as a separate volume in 1885.

In the same year Edmund Boissier died. It was only natural that the mantle of the great phytographer should fall on Barbey, but in wise recognition of his powers and abilities he preferred to establish himself as the guardian of the legacy which Boissier had left to the botanical world, and in this he has earned the gratitude of the disciples of our science even more than by his botanical publications. Under the will of Dr. Pierre Butini, Boissier's father-in-law, the house containing Boissier's herbarium and library became, after Boissier's death, the property of the city of Geneva. The question of finding a new home for the collections became therefore urgent, and it was settled, almost at once, by the acquisition of a convenient site and the erection of an adequate building not far from Boissier's old house at Chambésy. Two years later (1887) the new "Herbier Boissier" was opened under the curatorship of E. Autran. Barbey continued to augment the collections with great liberality, and at the same time placed them with equal generosity at the disposal of all botanists. No one who has enjoyed the hospitality of the charming herbarium at Chambésy will ever forget the debt of gratitude which he owes to the memory of the two generous and public-spirited men who have created and preserved this refugium of botanical science and set it in a spot of such rare natural beauty.

Barbey's zeal, however, did not stop there, for in 1893 he founded the "Bulletin de l'Herbier Boissier," which he carried on at his own expense until December, 1908. It is unnecessary to dilate on the value of this publication, which was open practically to the whole of the botanical world, and its cessation is a matter of great regret. Another venture of Barbey's, conceived in his usual endeavour to serve the general good, had an even shorter life, namely, the publication of an "Index botanique universel," a card catalogue of all the new species of vascular plants of the Old World published after 1900. The fault was not his; had the enterprise been supported in the spirit in which it was

started, it would no doubt have won the day and become self-supporting.

The death of William Barbey is a great loss not only to botanical science, but also to his country. It means the loss of an independent and true patriot, of a liberal supporter of public institutions, and in narrower circles of a genuine friend of local botanical exploration and a patron of skilled gardening.

The memory of William Barbey still lives, like that of his father-in-law, in the Herbarium at Chambésy, and it is hoped that, through the generosity of his family, it may long remain a symbol of filial piety, enlightened citizenship and that wider humanity which stretches across political frontiers and binds us all in our common heritage of knowledge.†

Kew and the War.—Seventy-seven members of the Kew staff are now serving with His Majesty's forces on land and sea. Since the publication of the last note eleven more men have volunteered their services, of whom six are sub-foremen. Three young gardeners, the motor-mower driver and one of the labourers make up the number.

Sylviculture in the Tropics.*—Sylviculture in temperate regions has a considerable literature, containing of course much that is applicable to tropical conditions; but there was a need for a handy practical volume designed especially for the use of the forester in the Tropics. This need has been met by Mr. Broun; whose experience in the Indian Forest Service, afterwards as Conservator of Forests in Ceylon, and finally as Director of Woods and Forests under the Sudan Government, has well equipped him for a work of the kind. The book is written in simple lucid language, and well illustrated by photographs of trees or forest scenes and by woodcuts of sylvicultural implements, &c.

The work is divided into four parts of which the first is practically an article on forest ecology, based largely, as the author acknowledges, on Schimper's *Plant Geography*, and on Dr. Russell's article, *The Soil and the Plant*, published in *Science Progress* for July, 1911. The second part deals with the Formation and Regeneration of Woodland Crops; the third with the Training and Improvement of Forests; and the fourth with Special Measures of Maintenance and Protection, terminating with an interesting and useful chapter on the Fixation of shifting sands and of unstable slopes.

† Our thanks are due to M. Gustave Beauverd, the able Curator of the Boissier Herbarium, for allowing us to read the proof of Prof. Chodat's forthcoming biographical sketch of William Barbey, on which this note has been largely based.

* Sylviculture in the Tropics by A. F. Broun. London: Macmillan & Co., Ltd., 1912, 8vo., pp. xviii and 309, with 96 text figures. Price 8s. 6d.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 3] [1915

XI.—NOTES ON SOUTH AFRICAN SANTALACEAE.

Thesidium.

The genus *Thesidium* falls naturally into two parts, making a useful subdivision for purposes of classification. In some of the species the male and female plants are quite similar in general appearance, while in the others they are so unlike that without evidence from the collector it is hardly possible to assign specimens of male plants to their proper females.

To the group of species with similar male and female plants belong *T. exocarpaeoides*, Sond., *T. Thunbergii*, Sond. and *T. fragile*, Sond., while those with the males and females unlike are *T. hirtum*, Sond., *T. minus*, A. W. Hill, *T. fruticulosum*, A. W. Hill and *T. longifolium*, A. W. Hill.

That the difficulty with these dissimilar forms is a real one is shown by the fact that De Candolle described as two species (*Thesium globosum* and *Thesium strigulosum**), the female and male plants respectively of one and the same species which Sonder rightly included together under the name of *Thesidium hirtum* (in Flora, 1857, 365).

Of the three new species *T. longifolium* is the most striking from the conspicuous disparity between the two sexes; the male plant closely resembles that of *T. fruticulosum*, while the female with its comparatively long stems and elongate, lanceolate leaves and bracts, is distinct from any other species and quite unlike the male. Throughout this small genus the male flowers show scarcely any difference, and the female flowers also are not markedly different in the several species.

The species, therefore, have to be separated almost entirely on vegetative characters, and especially on those of the bracts and bracteoles. Between the species with the males and females resembling each other the differences are not very well marked, and

* A. DC. Esp. Nouv. Thes. 1857, p. 4; placed under *Thesidium*, but both species retained in DC. Prodr. xiv. 673.

(3769.) Wt. 225–595. 1,125. 4 15. J. T. & S. G. 14.

T. exocarpaeoides (Thesidium microcarpum, *A.DC.* in DC. Prodr. xiv. 674), *T. Thunbergii* (T. podocarpum, *A.DC.* in DC. Prodr. l.c.), and *T. fragile* form a nicely graduated series of closely allied species. It is possible that *T. Thunbergii* may represent only a lax form of *T. fragile*, as the characters which can be used to separate them are not very precise.

Thesium leptostachyum, described by De Candolle from a male specimen only, may prove to be conspecific with *T. minus* described below. Dr. C. Lindman has very kindly sent a drawing of the small specimen preserved at Stockholm and compared it with a male plant of *T. minus*. *T. leptostachyum* has a distinctly verruculose stem and the edges of the bracts and perianth segments are fringed with fine hairs, while in *T. minus* the hairs are absent. It seems best therefore to leave De Candolle's species undisturbed until a more comprehensive collection of the species of *Thesidium* can be made.

But little interest would seem to have been taken in the genus by South African botanists, though it is one which would repay further study if only from the sowing of seed in order to ensure the proper correlation of the male and female plants.

T. longifolium has only been collected by Bolus and most of the other species are poorly represented in herbaria.

Thesidium minus, *A. W. Hill*; species annua, parva, subglabra, plantis masculis et feminis dissimilibus, bracteis in plantis masculis floribus brevioribus vel subequalibus distinguenda.

Planta annua; radix princeps robusta; caules praesertim in plantis masculeis numerosi, e rhizomate erecti vel patuli, superne parce ramosi, 7–15 cm. longi, costati, fere omnino floriferi, subglabri. *Folia* inferiora anguste lineari-lanceolata vel acicularia, costa distincta, 0·6–1·2 cm. longa, conspicua, in plantis feminis sensim in bracteas lineares in plantis masculis abrupte in bracteas subulatas mutantia. *Inflorescentiae* simplices vel ramosae; bracteae bracteolaeque ovato-lanceolatae vel subulatae, naviculares, curvatae, acutae, leviter carinatae, floribus aequales vel breviores, 1 mm. longae, marginibus translucentibus vix scabridis verruculosis. *Flores* sessiles, e cymulis 3-floris constituti in glomerulos axillares dispositi; perianthium 0·75 mm. longum; segmenta patula, 0·5 mm. longa. *Inflorescentiae* simplices vel ramosae; bracteae foliosae, erectae vel patulae, lineares vel aciculares, abruptē acutae, 3–5 mm. longae, carinatae, subscabridulae marginibus carinisque membranaceis; bracteolae 1·25 mm. longae, floribus subaequales vel breviores, plicatae, acute carinatae. *Flores* plerumque solitarii, interdum floribus lateralibus demum evoluti, breviter pedicellati; perianthium circiter 0·5 mm. longum; segmenta 0·35 mm. longa, marginibus plus minusve undulatis; stylus 0·25 mm. longus. *Fructus* globosus, 1 mm. diametro, prominenter reticulatus, stipite 1 mm. longo.

South Africa. Caledon Div.; Houw Hoek, 380 m., *Schlechter* 9431 ! 9432 ! near Vogelgat, 380 m., *Schlechter* 10,415 ?. Bredasdale Div.; Riet Fontein Poort, near Elim, *Bolus* 8601 ! Riversdale, *Rust* 280 ! Garcias Pass, 1200 ft., *Galpin* 4554 !

T. fruticulosum, *A. W. Hill*; species suffruticosa, robusta, ramulorum, costis et bracteis verruculosis vel subscabridulis bracteis floribus paullo longioribus, floribus binis in bractearum cornearum axillis in plantis feminis distincta.

Suffrutex circiter 30 cm. altus; caules erecti vel patuli, in plantis masculis multe ramosi, robusti, lignosi, acute costati vel subangulati, costis verruculosis vel subscabridulis. *Plantae masculae*; rami numerosi, recti, patuli, costis prominenter verruculosis vel subscabridis, omnino et plus minusve dense floriferi; bracteae foliosae, lanceolatae, acutae, circiter 3 mm. longae, acute carinatae, supra planae, verruculosae vel subscabridulae, carina et marginibus translucentibus; bracteolae 2·5 mm. longae, floribus longiores; flores in cymulas 3-floras axillares subsessiles; perianthium 1·25 mm. longum; segmenta triangulari-ovata, 0·75 mm. longa; antherae circiter 0·15 mm. longae. *Plantae feminae*: rami robusti, erecti, inflorescentiis axillaribus confertis ornati, angulati, angulis prominentibus corneis verruculosis; bracteae lanceolatae, 4–6 mm. longae, carinatae, carinis acute alatis in caule decurrentibus corneis et scabridis, marginibus plicatis scabridis; bracteolae bracteis similes, floribus longiores; flores in cymulas 2-floras dispositi, axillares, sessiles; perianthium circiter 0·75 mm. longum; segmenta erecta, 0·5 mm. longa; stylus robustus, 0·25 mm. longus. *Fructus* subsessilis globosus, 1–5 mm. diametro, conspicue reticulatus.

South Africa. Cape Div.; Table Mt., on Groene Kloof, *Galpin* 4556! Slang Kop, 220 m., *Wolley Dod* 3187! slopes near Buffels Bay, *Wolley Dod* 2869! Durban Hills, *Guthrie* 2407! Caledon Div., near Vogelgat, 320 m., *Schlechter* 10,414 (?) without definite locality, *Harvey* 709 ♂ and ♀!

T. longifolium, *A. W. Hill*; species eximia, conspicue scabridula, foliis elongatis, bracteis in plantis feminis speciosis alatis scabridulo-fimbriatis, floribus solitariis distincta.

Suffrutex circiter 38 cm. altus; caules erecti, basi lignosi, conspicue costati et angulati, costis angulisque scabrido-verruculosis. *Folia inferiora* anguste lineari-lanceolata, acuta, carinata, 2–2·5 cm. longa vel ultra, marginibus et carinis translucentibus scabrido-verruculosis vel fimbriatis. *Flores* omnino subdense dispositi. *Plantae masculae*: bracteae patulae, ovato-lanceolatae, acutae, 3 mm. longae, marginibus carinisque translucentibus scabridulis vel scabrido-fimbriatis; carinae ala conspicue decurrens; bracteolae 1·5 mm. longae, marginibus plicatis; flores in cymulas circiter 5-floras axillares, cymulis glomeratis; perianthium 1 mm. longum; segmenta 0·75 mm. longa; stylus rudimentarius frequenter evolutus. *Plantae feminae*: bracteae foliosae, conspicuae, lanceolatae, acutae, ascendentes vel leviter recurvatae, 1·2–1·4 cm. longae; bracteolae marginibus plicatis translucentibus scabridulis vel scabrido-fimbriatis carina acuta; flores in bracteolis magnis inclusi, solitarii; perianthium 1 mm. longum; segmenta 0·5 mm. longa; discus prominens. *Fructus* globosus, circiter 2 mm. diametro, stipitatus, conspicue reticulatus.

South Africa. Cape Div.; eastern side of Table Mt., 380 m., *Bolus* 4607! 4608!

Osyris, Rhoiacarpos and Osyridicarpos.

Bergius founded the genus *Colpoon* to receive an *Osyris*-like plant with opposite leaves, and gives a figure in his Pl. Cap. tab. 1 fig. i. De Candolle in the Prodromus did not retain the genus, but regarded it only as a section of *Osyris*, Linn., distinguished in possessing opposite leaves. In the Genera Plantarum, Bentham and Hooker maintain both *Osyris* and *Colpoon*, and with the latter unite the genus *Rhoiacarpos*, A.DC or *Hamiltonia*, Harv.

In the forthcoming volume of the Flora Capensis it has not been found possible to uphold Bergius' genus *Colpoon;* the character of the opposite leaves is far from constant, and on the same specimen leaves may be found arranged in opposite or sub-opposite pairs or they may be more or less alternate. In floral characters no difference can be noticed between plants with alternate leaves placed under *Osyris abyssinica*, Hochst., and those with more or less opposite leaves formerly placed under *Colpoon compressum*, Berg. The leaves in all specimens are flat, glaucous- or grey-green and very variable in shape with mucronate apices; the inflorescences are as a rule axillary and inconspicuous, and there is no distinction between the fruits of the plants which have been assigned to the two genera.

Among the large range of specimens examined the general uniformity in appearance is remarkable, only two specimens preserved in the Bolus Herbarium are strikingly different from the type. In these the leaves and bracts are large and the inflorescences form conspicuous panicles, consequently they have been described as a variety.

Osyris abyssinica, *Hochst.*, var. **speciosa**, A. W. Hill, a typo habitu robustiore, inflorescentiis subaphyllis multo exsertis, bracteis floribusque majoribus praecipue differt.

Caledon Div.; near Houw Hoek, 350 m. *Bolus;* near Hermanus Pietersfontein, 30 m., *Bolus* (specimens in Bolus Herbarium).

The genus *Rhoiacarpos*, A.DC., is retained in the forthcoming volume of the Flora Capensis, since not only can it be easily recognised but it appears to be sufficiently distinct from *Osyris* to be worthy of separate generic rank. The leaves are opposite, stout and leathery, varnished or polished above and with the margins slightly inrolled; the flowers are hermaphrodite, fleshy or leathery and fairly large, with a short but definite perianth-tube. Only one species, *R. capensis*, A.DC. has been recorded.

The genus *Osyridicarpos* appears to be represented in the Cape Region by only one species, *O. natalensis*, A.DC. The flower in the type is remarkable in possessing five external callosities at the base of the perianth-tube alternating in position with the perianth-segments. These callosities, which are very marked in some specimens are not evident in others, but their presence or absence does not appear to indicate specific difference. The morphology of these bodies is worthy of careful investigation.

Grubbia.

Grubbia occupies an anomalous position in the natural order

Santalaceae. In Harvey and Sonder's "Flora Capensis" it was included under *Hamamelidaceae*, but it has been redescribed for the forthcoming volume of the Flora Capensis under *Santalaceae*. De Candolle placed the genus in a separate natural order, *Grubbiaceae*, which immediately precedes the *Santalaceae* in the Prodromus, while Bentham and Hooker place it in their fourth tribe, *Grubbieae*, at the end of *Santalaceae*, and consider the genus to be an anomalous one in the order.

Three species were described by De Candolle and four by Sonder.* Material of the types of the four species has been examined and it is clear that they should all stand.

G. stricta, with its many-flowered axillary strobili, is very distinct from the three other species, where the flowers are arranged in three-flowered fused cymules, and it was even described as a species of *Taxus* by Bergius.

G. rosmarinifolia, *G. pinifolia* and *G. hirsuta* form a very natural group of closely allied species.

G. pinifolia is distinguished from the common form, *G. rosmarinifolia*, especially in the leaves, which are not hastate at the base but are almost decurrent into the definite petioles. The stems and petioles are also minutely downy. Through the kindness of Dr. Lindman a piece of the type specimen of *G. pinifolia* (Stellenbosch, *Ecklon and Zeyher*) preserved at Stockholm has been examined and has been found to agree exactly with the specimen collected by *MacOwan* (No. 918) on Table Mountain.

G. hirsuta may be recognised by its very villous covering, by the undivided small bracts and also by the fruits, which are evenly covered by very short thick hairs.

Thesium.

The synonym *Frisca*, Spach, reduced in the Index Kewensis to *Thesium*, is the result of a misprint made by Endlicher and perpetuated by Spach. R. Brown (Prod. Fl. Nov. Holl. p. 353) had previously written *T. frisca* when quoting the Linnean species *T. Frisca*.

The specific name *Frisca* was given by Linnaeus to a South African species of *Thesium* collected by Koenig. It was published with a capital initial letter and it is clear therefore that it was being treated as a generic name though no such genus had been published. The type specimen in the Linnean Herbarium is labelled *Frisca Koenigii*, apparently in Koenig's handwriting, and it seems probable that Linnaeus in determining the plant as a *Thesium* adopted Koenig's unpublished name.

The origin of the name *Frisca* cannot be traced. The error in spelling *Frisca* for *Frisca* has also led to a further curious mistake. The following is a quotation from Wittstein's Etymologisch-botanisches Handwörterbuch, an exceedingly useful work of its kind:—

"Frisca R. (Santalaceae). Nach Th. Frisca, der sich am Cap im botanischen Interesse aufhielt." The "R" here signifies Reichenbach, but this botanist wrote (Consp. Reg. Veg. p. 80), not

* Sonder in Harvey and Sonder, Fl. Cap. ii. pp. 325–327.

Frisca, but *Frisea*, using the name for a subgenus or section of *Thesium*, and adopting it doubtless from *Thesium Frisea*, Linn. Mant. ii. p. 213. Endlicher (Gen. Plant. p. 326) and Spach (Hist. Veg. Phan. x. p. 460), have incorrectly written *Frisca*, attributing the name to Reichenbach. Wittstein therefore was not the originator of this mistake, but by a curious misreading of the following paragraph from Endlicher's General Plantarum he is responsible for evolving from what is merely the name of a plant, a person who, in the interests of botany, sojourned at the Cape.

Endlicher wrote:—"Frisca Reichenb. Consp. 80. Thesii sp. capenses Auct. Th. Frisca, crassifolium, funale, spicatum. . ." "Th. Frisca" is of course nothing more than *Thesium Frisea*.

The following reduction should have been included in my paper on *Thesium* in *K.B.* no. 1, 1915:—

T. Zeyheri, *A.DC.* Esp. Nouv. Thes. 6; A.DC. in DC. Prodr. xiv. 666; Sond. in Flora, 1857, 407. *T. transgariepinum*, Sond. in Flora, 1857, 356. *T. longirostre*, Schlechter in Journ. Bot. 1897, 345; ex A. W. Hill in Kew Bull. 1910, 186. *T. Schlechteri*, A. W. Hill in Dyer Fl. Trop. Africa, vi. 1, 415.

The species has a somewhat curious distribution having been recorded in South Africa only from the eastern districts, E. of Long. 28°, while in Tropical Africa the only known habitat is in the Auas mountains, German South West Africa.

A. W. HILL.

XII.—FOMES JUNIPERINUS AND ITS OCCURRENCE IN BRITISH EAST AFRICA.

E. M. WAKEFIELD.

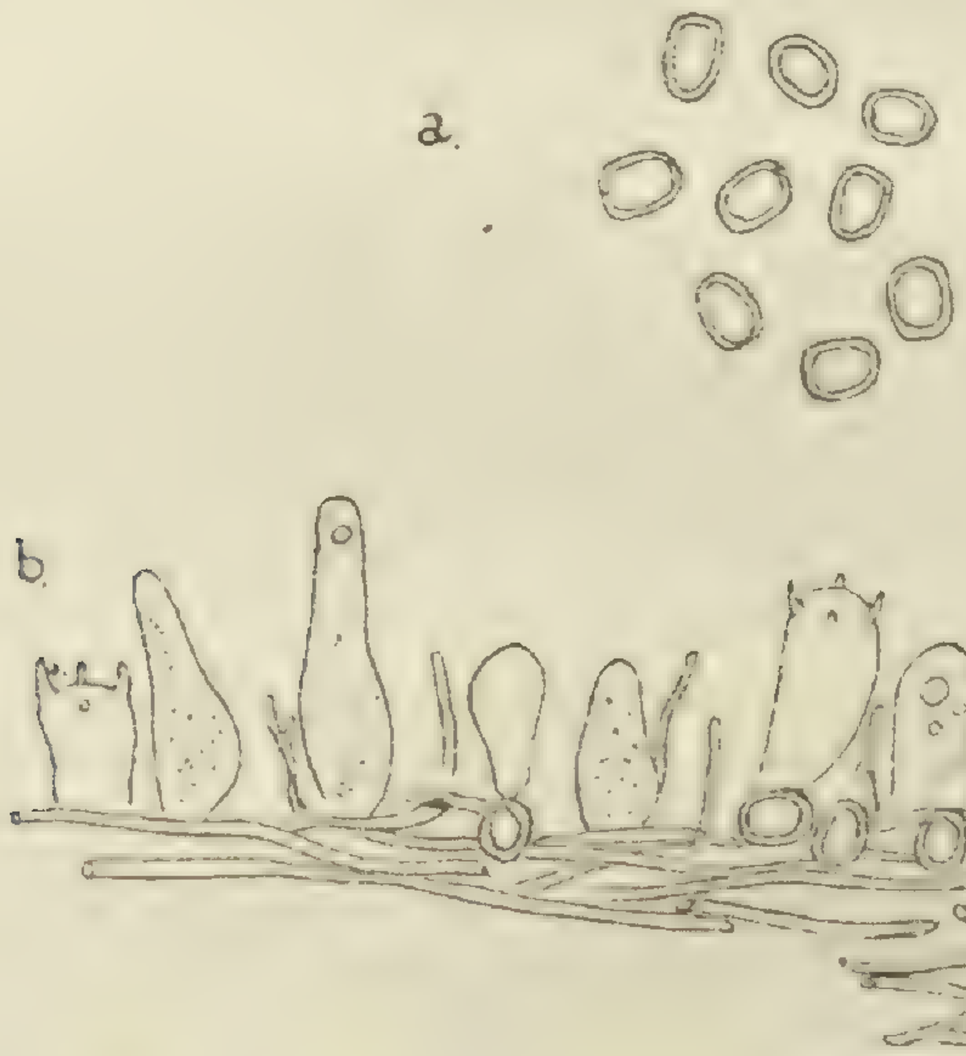
An interesting specimen, illustrating the wide distribution of many fungi of economic importance, has been received from the East Africa Protectorate. Amongst some fungi sent for determination by Mr. W. J. Dowson, Government Mycologist, Nairobi, were two fine specimens of *Fomes juniperinus* (Schrenk) Sacc. & Syd. On inquiry as to the circumstances under which they were found, Mr. Dowson kindly supplied the following information:—

"No. 176. This is the most serious parasite occurring in the East African forests, and, so far as is known, is only found on the indigenous cedars. The commonest cedar, and the only one named, is *Juniperus procera*, but there are probably others. *J. procera* is found at altitudes varying between 7000 and 9000 feet, where it is not too damp (*i.e.*, just north of Nairobi, on the Aberdare Range, both Kikuyu and Mau escarpments of the Rift Valley, and on the north-west slopes of Mount Kenia. The south-east half of Kenia is much moister).

"The sporophores always arise just *below* a withered branch, which has evidently been dead many years. Trees carrying sporophores when cut down are always rotted very considerably at the centre. Large trees of five feet in diameter have holes in them from anything up to two feet across. The edges of these cavities are jagged and irregular, the portions in between the projections having been reduced to a soft, spongy mass."

Fomes juniperinus was described by von Schrenk*, as causing a "White Rot" of the Red Cedar (*Juniperus virginianus*) in the eastern United States, characterised by the formation of long holes in the heart-wood. The African specimens agree well with his description, both of the sporophore and of the type of disease caused by the fungus. The species is recognisable by the yellowish pores, and the brick-red colour of the flesh and the older layers of tubes. Murrill† has described *Fomes Earlei* (Murr.) Sacc. & D. Sacc., also on *Juniperus*, which he states is closely related to *F. juniperinus*, but differs in being more rimose, having larger pores, and lacking the annual projecting margins of the older tube layers which occur in the two original specimens of *F. juniperinus*. The descriptions of the two species, however, differ only in minor details, although Hedgcock and Long‡ have maintained that they are distinct and cause different types of "rot."

Of the two specimens from East Africa one is broadly ungulate, but little cracked, and velvety tomentose, especially at the margin; the other is much more rimose and elongated, with scarcely any tomentum, agreeing, therefore, in habit with "*F. Earlei*." The pores in both reach the edge of the pileus, where, however, they are not properly developed; and in one specimen, in which two seasons' growth of pores is visible, the pores of the last season are 2–3 to a mm., while those of the previous season are 1–2 to a mm., so that the differences in pore-size, given as one of the marks of distinction for the two species, may be found in one and the same specimen.



The spores (Text-fig. *a*) are very abundant, 6–8 × 5–6 μ, broadly elliptical or oblong, and more or less angular in shape, thick-walled, pale yellow in the youngest pores, but red-brown in the older pores, as stated in the original description. The structure of the hymenium is very difficult to see, on account of the delicacy

* H. v. Schrenk. Two Diseases of Red Cedar. Bull 21, U.S. Dep. Agric., Div. of Veg. Phys. and Path., 1900.

† Murrill. Bull. Torr. Bot. Club, xxx. 1903, p. 116, and in North American Flora, ix. pp. 106–7.

‡ Hedgcock & Long in Mycologia, iv, 1912, p. 109.

of the elements and the abundance of spores, and discrepancies occur in the various descriptions published, as to the presence of cystidia. Schrenk mentioned "blunt cystidia" projecting but little over the surface of the hymenium. Hedgcock and Long describe for *F. juniperinus* "cystidia few, nearly colourless, 100 × 20 μ, pointed, somewhat encrusted," and for *F. Earlei* no cystidia, while Lloyd*, who examined part of the type specimen of *F. juniperinus*, states that no cystidia are present. In the specimens at Kew, the hymenium consists of young and mature basidia, the latter with 2–4 sterigmata, and between these are occasional sterile bodies of varying size (Text-fig. *b*). These are hyaline, very thin-walled, smooth, cylindrical or somewhat fusiform, projecting very little, 7 μ wide and up to 25 μ long. Without an examination of the type material, it is not possible to say whether these may be von Schrenk's cystidia. No large cystidia like those described by Hedgcock and Long are present.

The distribution of the fungus, as at present known, is peculiar. In the United States *F. juniperinus* has been recorded from Tennessee, Kentucky and Maryland, and *F. Earlei* from Texas, New Mexico, Arizona and Colorado. Lloyd† has recorded it from Russia, and has pointed out* that *F. Demidoffii* (Lév.) Sacc., described on *Juniperus excelsa* from Russia, was probably the same species. The new record from East Africa gives a third widely separated locality. The fungus does not as yet appear to have been recorded from any other part of the world, and even where found, the sporophores seem to be as a rule but sparingly produced.

XIII.—BLISTER DISEASE OF FRUIT TREES.

G. Massee.

(With Plate.)

The blistering and cracking of the shoots and fruit of apple, pear and cherry trees is of common occurrence, and in many instances, more especially when the fruit is attacked, the injury is of a serious nature. The general superficial appearance of the disease resembles that of apple scab, caused by *Venturia inaequalis*, Aderh., and as such has up to the present been mistaken in this country, although what appears to be the same disease, has been described by Pole-Evans‡ and P. A. van der Bijl§ as present on apple trees in South Africa. In this instance, however, the authors were only acquainted with one stage in the life-cycle of the fungus concerned, to which they applied the name *Coniothecium chomatosporum*, Corda.

Small blisters during July and August on the young shoots of the year is the first indication of the presence of the disease. Later in the season the skin or epidermis covering these blisters is ruptured, and a blackish-olive patch is exposed, which on microscopic examination

* Lloyd. Mycol. Notes, No. 38, 1912, p. 522.
† Lloyd. Letter No. 38, p. 10.
‡ Pole-Evans, I. B., Transvaal Agric. Journ., 5, p. 680 (1907).
§ Bijl, Paul A. van der. S. African Agric. Journ., 8, p. 64 (1914).

proves to consist of a tangled mass of olive-coloured mycelium, which gives origin to numerous clusters of various sizes, composed of very large, globose cells, each having two septa crossing at right angles. This condition of the fungus under consideration was at one time considered as an entity, and was known as *Coniothecium chomatosporum*, Corda. During the autumn and winter the dark-coloured mycelium, emerging through the ruptured blisters, spreads on the surface of the shoot, forming blackish-olive patches of varying extent. The mycelium of the fungus is confined to the cortex, which is killed down to the wood, and during the winter the branch dies. In the spring the masses of large cells of the *Coniothecium* give origin to myriads of small, elliptical, hyaline spores by a process of budding, and these minute spores are capable of infecting young apple shoots, and giving origin to the *Coniothecium* condition of the fungus, which is thus capable of reproducing itself indefinitely without the intervention of the two other stages of the fungus to be described, known respectively as *Phoma mali*, Schulz and Sacc., and *Diaporthe ambigua*, Nits., the latter being the ascigerous form. The *Phoma* and the *Diaporthe* are both pure saprophytes, appearing on the branches killed by the *Coniothecium*, which is the only parasitic form included in the life-cycle of the fungus.

The small, hyaline spores produced by budding from the large *Coniothecium* cells were placed on sterilised and uninjured young apple shoots, protected from outside infection by waterproof paper. After an interval of seven weeks, small blisters were present on the shoot, which, on microscopic examination, proved to be caused by the growth of masses or conglomerations of large *Coniothecium* cells. These masses continue to increase in size and press the epidermis upwards, at first forming a wart or blister; eventually the epidermis is ruptured. The blisters invariably first appeared close to the lenticel, which suggests that infection only occurs at these points, and that the budding spores cannot enter through the unbroken epidermis. In course of time, the mycelium spreads in the cortex, and blisters, due to clusters of cells, may appear at any point on the shoot. When budding spores are sown in a nutritive medium, the mycelium is at first colourless and very slender, and gradually passes through a pale olive to an almost opaque blackish-olive colour, and at the expiration of about six weeks, numerous conglomerations of large cells are present. The large cells commence budding at once. When petri-dish cultures of budding spores are about three months old, the *Phoma* stage of the fungus is produced in abundance. *Phoma* spores from such cultures, sown in a nutrient medium, gave origin, first to the *Coniothecium* condition and afterwards to the *Phoma*. *Phoma* spores from the same source, when placed on young apple shoots, gave origin to the *Coniothecium* condition of the fungus. In every experiment with *Phoma* spores, whether obtained from pure cultures or from the *Phoma* on shoots that had been killed the previous year by the *Coniothecium*, the first product of germination was the *Coniothecium* condition, followed by the *Phoma*; hence it may be concluded that the infection of young shoots and fruit may also be due to the *Phoma* stage of the fungus present on dead shoots.

When the fruit is attacked, the effect produced depends to a great extent on the age at which infection occurs. On the young, hard fruit

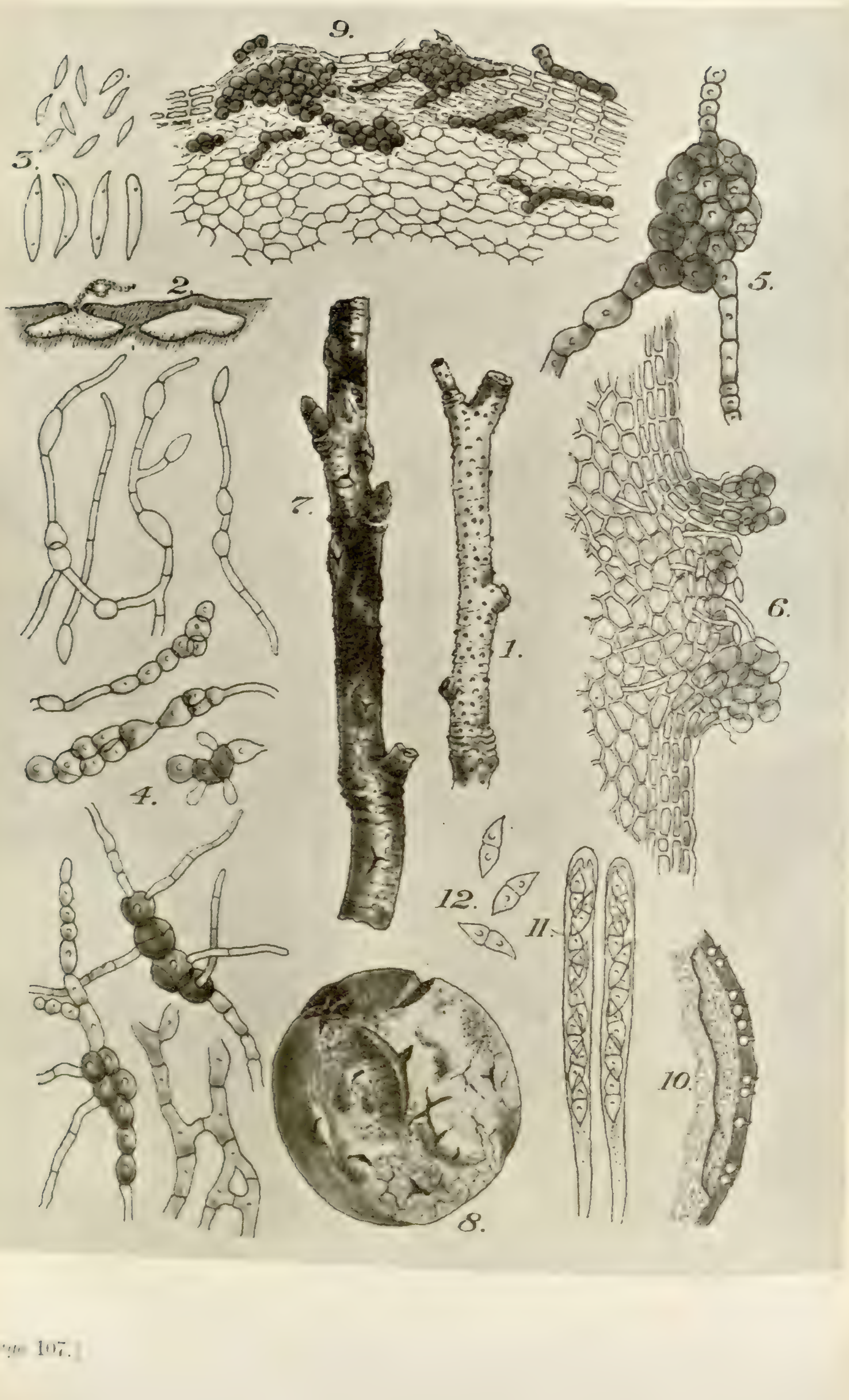
blisters are formed and the tissue is soon killed at the points of infection. This often results in the formation of cracks, which continue to increase in size as the apple grows. The general appearance in this case resembles that of apple scab. When the fruit is partly ripe, large, brown, depressed patches are formed, the skin becomes black and parchment-like, and numerous masses of *Coniothecium* are produced in the tissue. At a later stage, the *Phoma* form of fruit bursts through the blackened skin. In the case of the fruit, infection takes place through the numerous minute ruptures of the skin which are perhaps imperfectly-formed lenticels.

Coniothecium has for some time been considered of doubtful generic value. In "British Fungus Flora"* the following rider to the generic diagnosis occurs: "Conidia usually very variable, resembling conglomerations of cells of variable size. A very badly-defined genus, and it is doubtful whether many of the so-called species are such in reality." Mr. C. O. Farquharson was the first to demonstrate that *Coniothecium* resulted from the germination of *Phoma* spores, when working at a water-lily disease in the Jodrell laboratory, but the investigation was not completed owing to his departure for Southern Nigeria as mycologist. He also proved that the spores of *Phoma alnetis*, Br., produced a *Coniothecium* stage on germination, hence, in future, *Coniothecium* will only be retained as a form-genus until its components are correlated with their respective *Phoma* forms.

The *Phoma* stage appears in great abundance in the spring on shoots and spurs killed by the *Coniothecium* the previous year. From other species of *Phoma* occurring on the same hosts, *P. mali* is readily distinguished by the form of the perithecium and the spores. The perithecium is very much vertically depressed, so that a section is irregularly biconvex. The spores are fusiform or spindle-shaped and measure 7–8 × 2–3 μ. Spores of the *Phoma* placed on sterilised apple shoots were found to enter the tissue only through the lenticels. On germination, a weft of very delicate hyaline mycelium surrounded the dead cells of the lenticel, and afterwards spread into the adjoining living tissue of the cortex, where they increased considerably in thickness and gradually assumed an olive-green colour, and gave origin to typical *Coniothecium* groups of cells. In all probability the mycelium first produced by the spores lives as a saprophyte, obtaining its food from the dead tissue of the lenticel, and afterwards assumes a parasitic habit. The parasitic phase is, however, not absolutely necessary, as when *Phoma* spores are sown in a nutrient medium the *Coniothecium* and *Phoma* stages are produced in due course. This, however, may not occur in nature, as I have not succeeded in infecting dead shoots with either *Coniothecium* or *Phoma* spores.

The ascigerous form of fruit is rare, and, as in many other cases, would appear to play but an unimportant part in the continuation of the species, either as regards time or space. It occurs on dead twigs either along with the *Phoma* or at a later stage. I have only met with the ascigerous stage once—on dead apple twigs, accompanying the *Phoma*. The ascigerous spores sown on a nutrient medium produced a dense mass of colourless mycelium, which gave origin to the *Phoma* without the intervention of the *Coniothecium*; the latter, how-

* Massee, G., Brit. Fungus Flora, 3, p. 427 (1893).



... face page 107.]

ever, was formed as usual from the *Phoma* spores obtained from the germination of ascigerous spores.

As to preventive measures, probably spraying with Bordeaux mixture, if applied sufficiently often, would save young shoots and fruit from infection, but the process would have to be repeated every season. The most certain method for preventing infection would be to remove the dead twigs and spurs bearing the fungus.

DESCRIPTION OF THE FIGURES.

1. *Phoma* stage of fungus on a dead apple twig. Nat. size.
2. Section of *Phoma* perithecia on apple shoot. Mag.
3. *Phoma* spores. Mag.
4. Various stages of germination of *Phoma* spores, and the production of the condition known as *Coniothecium* from the mycelium. Mag.
5. A more advanced condition of the *Coniothecium* stage. Mag.
6. Spores of the *Phoma* germinating on the surface of a lenticel of an apple twig. The mycelium is seen penetrating the tissue of the cortex. Mag.
7. Portion of an apple shoot showing the effect produced by the *Coniothecium* stage of the disease. Nat. size.
8. An apple showing the *Coniothecium* stage of the disease. Nat. size.
9. Section through the cortex of an apple twig, showing the *Coniothecium* in the tissues. Mag.
10. Section through the stroma and perithecia of *Diaporthe ambigua*, the ascigerous stage of the fungus. Mag.
11. Asci and spores of *Diaporthe ambigua*. Mag.
12. Free spores of *Diaporthe ambigua*. Mag.

XIV.—SOME CHINESE MARINE ALGAE.

A. D. Cotton.

Two packets of marine algae from Wei-hai-wei were recently presented to Kew by the Rev. H. Boyden, of Exeter. The material was collected by Mr. Boyden's son, Dr. P. Hamilton Boyden, surgeon in the Royal Navy, mainly during 1913, but some specimens bear the date October, 1910.

In the *Journal of Botany* for 1904 Mrs. Gepp reported on a collection from the same locality, also made by Dr. Boyden, and this is practically the only recent list—at all events in a European language—of marine algae from China. Some older papers, which include several Chinese records, are in existence, but, owing to the liberal views then held as to species, and to other reasons, these lists require thorough revision. The present collection differs decidedly from that examined by Mrs. Gepp, a fact which shows how the flora varies, and one which should be an encouragement to botanists and others who take the trouble to investigate the seaweed flora of these little-known shores. Though most valuable, the collections forwarded by Dr. Boyden can only be regarded as samples. The littoral flora doubtless varies, not only through the different months of the year, but also with the different types of habitat afforded by the coast-line. Further samples as opportunity offers would therefore be most welcome.

Much of the coast of northern China is unfavourable for a good seaweed flora. Owing to the presence of the great Hoang-ho, or

Yellow River, the Gulf of Pechilli is for the most part muddy, and in the neighbourhood of Shanghai the whole seaboard is poor owing to the enormous amount of fresh water brought down by the Yang-tse-kiang. Wei-hai-wei, though possessing a good rocky shore, appears to be rather barren. In a letter quoted by Mrs. Gepp in the *Journal of Botany* (vol. xlii. p. 161) Dr. Boyden writes as follows: "The fact which struck me most was the absence of large seaweeds, *e.g.*, *Fucus* and *Laminaria*. Possibly this may be due to the sheltered situation of that part of Lin-kung-tao Island . . . but even on the seaward side there seemed to be very few. This may be due to the coldness of the water from the absence of a warm current, these waters being outside the influence of the Kurosiwo, or Japan stream. The specimens were got in pools left by the tide in the rocks, which were for the most part flat. On the seaward side the rocks are very precipitous, shelving down several hundred feet. The rocks are metamorphic, consisting of beds of quartzite, gneiss, crystallite, and limestone, cut across by dykes of volcanic rock and granite. Mica abounds everywhere. Where the seaweeds were found the rocks were mostly granite and gneiss." Dr. Boyden's 1913 material evidently contains several littoral and rock-pool species, but such plants as *Desmarestia viridis* and the species of Sargassa were doubtless washed ashore from the sub-littoral region.

During the ordinary routine work in the Herbarium specimens of Chinese algae, mostly un-named, have from time to time been noted. These are chiefly from Hongkong and Macao, but unfortunately they are in rather poor condition. It has, however, been possible to determine several species, and, as the marine flora of China is so little known, it seems advisable, even though they belong to a district far south of Wei-hai-wei, to take this opportunity of putting them on record. Some Formosan specimens which exist at Kew may also be included in the list, as this island, though belonging to Japan, must geographically be included with China. The majority of these southern records consists, as would be expected, of members of well-known and common genera. The Sargassa bulk largely, and for assistance in naming these the writer is much indebted to Professor K. Yendo, who, during his visit to England last year, was kind enough to examine the whole of the Sargassa material from the Far East in the Kew herbarium. Dr. Yendo has spent many years studying, in the living state, this exceedingly difficult genus, and his revision of the Japanese species will be found in the *Journal of the Tokyo College of Science* (vol. xxi. art. 12, pp. 1-174).

The only country of the East the marine algal flora of which is thoroughly known is Japan, and consequently this is the only one with which that of northern China can be properly compared. For Japan we have the very useful enumeration by Matsumura, published in his *Index Plantarum Japonicarum*, 1904 (vol ii. pp. 3–127). This is, however, somewhat out of date, owing to the large amount of critical systematic work lately carried out by Japanese algologists. For Corea, three papers only are in

existence, namely, a short list by Okamura in the *Japanese Botanical Magazine* for 1892 (pp. 117–118), a more lengthy one in the *Kew Bulletin*, 1906 (pp. 366–373), and a paper published two years ago by Okamura, which, besides furnishing many additional names, includes all previous records (The Marine Algae of Chosen. Report of Imperial Bureau of Fisheries. Scientific Investigations, vol. ii. 1913, pp. 17–30.) The flora of Wei-hai-wei, so far as can be judged from our meagre knowledge, evidently resembles in a general way that of Corea and S. Japan, though we can already see that it possesses distinct species.

The following is a list of Dr. Boyden's algae, together with the other specimens alluded to above:—

Letterstedtia japonica, *Holmes* in Journ. Linn. Soc. xxxi. p. 50.
Wei-hai-wei, Oct. 1910, *Boyden* 3.
Distrib. Japan.

Enteromorpha compressa, *Grev.* Alg. Brit. p. 180.
Wei-hai-wei, June 1913, *Boyden* 31.
Distrib. Cosmopolitan.

Chaetomorpha aerea, *Kütz.* Sp. 379.
Wei-hai-wei, Oct. 1910, *Boyden* 1.
Distrib. Probably cosmopolitan.

Sargassum Horneri, *Ag.* Sp. p. 38; Yendo Fucaceae Japan, pp. 74–80.
Macao and adjacent islands, 1830, *G. H. Vachel.*
Distrib. Japan, Corea, China.
Full notes on the various forms assumed by this species and on the synonomy are given by Yendo (l.c.).

S. Ringgoldianum, *Harv.* in Proc. Amer. Acad. Sci. iv. p. 327; Yendo l.c. pp. 146–150.
Prov. Chekiang 1889, *E. Faber.*
Distrib. Japan, Corea, Gulf of Tartary.
Yendo shows that *S. coreanum*, J.Ag. is merely a female plant of this species.

S. serratifolium, *Ag.* Sp. p. 86; Yendo l.c. pp. 81–85.
Sold at Pekin, *Bretschneider* 201.
Distrib. Japan, Corea.
The upper part of this species very closely resembles *S. tortile.*

S. tortile, *Ag.* Sp. p. 15; Yendo l.c. pp. 85–92.
Hongkong, *H. F. Hance* 1354.
Distrib. Japan, Corea, China.

S. hemiphyllum, *Ag.* Sp. 39; Yendo l.c. pp. 99–102.
Formosa, *Oldham.*
Distrib. Japan, Corea, China.

S. glaucescens, *J.Ag.* Sp. i. p. 306.
Hongkong, Feb. 1890, *C. Ford* 196.
Distrib. S. China.
Two rather young plants are doubtfully referred by Yendo to this species.

S. cristaefolium, *Ag.* Sp. 13; Yendo l.c. p. 133.
Kelung, Formosa, *Oldham*.
Distrib. Ceylon, Phillipines, Japan.

S. Decaisnei, *J.Ag.* Sp. i. p. 329.
China, in herb. Berkeley.
Distrib. Red Sea.

S. linifolium, *Ag.* Sp. p. 18.
Hongkong, *H. F. Hance* 199.
Distrib. Mediterranean, Red Sea, Indian Ocean.

S. Henslowianum, *Ag.* in J.Ag. Sp. i. p. 315.
Macao, Hongkong, Feb. 1890, *C. Ford* 197.
Distrib. China, Cochin-China.

S. confusum, *Ag.* Syst. p. 301; Yendo l.c. pp. 106-112.
Wei-hai-wei, Oct. 1910, *Boyden* 15; June 1913, *Boyden* 28.
Distrib. Japan.

Turbinaria trialata, *Kütz.* Tab. Phyc. x. p. 24; Barton Syst. Struct. Turb. p. 218.
Macao, in herb. Hooker, sub *T. vulgaris.*
Distrib. General in warmer seas.

Cystophyllum Thunbergii, *J.Ag.* Sp. i. p. 233; Yendo l.c. pp. 114–119.
Wei-hai-wei, Oct. 1910, *Boyden* 16; June 1913. *Boyden* 29. Chefoo, 1861, *H. F. Hance.*
Distrib. Japan, Corea, China.

Padina Commersonii, *Bory,* Voy, Coquille no. 41 tab. 21.
Amoy, 1870, *R. Swinhoe.* Pratas Island, *Collingwood.*
Distrib. General in warmer seas.

Echlonia cava, *Kjellm* Jap. Lam. p. 273.
Sold at Pekin, *Bretschneider* 208.
Distrib. Japan.
Determined by Prof. Yendo, the structure of the thallus agreeing precisely with this species. The alga has not been previously recorded from China or Corea, and it is possible that the material may have been imported from Japan.

Carpomitra Cabrerae, *Kütz.* Phyc. gen. p. 343.
Wei-hai-wei, Oct. 1910. *Boyden* 10.
Distrib. S. England, S. Ireland, France, Spain, Mediterranean, Atlantic Islands, Japan, New South Wales, New Zealand.

As shown above, the distribution of this alga is peculiar. It is very rare in Britain and nowhere

abundant, though in parts of New Zealand it appears to be not infrequent.

Desmarestra viridis, *Lamour.* Ess. p. 43.

Wei-hai-wei, June 1913, *Boyden* 31.

Distrib. General in north temperate waters of Europe, Asia, and America.

The records of *D. viridis* from the southern hemisphere refer to a distinct species, *D. Willii*, Reinsch.

Scytosiphon lomentarius, *J. Ag.* Sp. i. p. 126.

Wei-hai-wei, June 1913, *Boyden* 32; Hongkong, Feb. 1890, *C. Ford* 193.

Distrib. Widely distributed in cold and temperate waters of both N. and S. hemispheres.

The Hongkong specimen is a very fine plant with broad fronds; those from Wei-hai-wei are narrow, and agree with some sent recently to Kew from Japan by Prof. Matsumura. The narrow form is apparently fairly common in the East.

Endarachne Binghamiae, *J. Ag.* Anal. Alg. Cont. iii. p. 27.

Formosa, *T. W. Watters* 139. Hongkong, Feb. 1890, *C. Ford* 194.

Distrib. Japan.

This plant has to be carefully distinguished from *Phyllitis fascia* and *Coilodesme bulligera*.

Hydroclathrus cancellatus, *Bory.* Dict. class viii. p. 419.

Hongkong, *C. Wright*; Pratas Island 1867, *Collingwood*.

Distrib. General in warmer seas.

Gelidium Amansii, *Lamour.* in Kütz. Tab. Phyc. xviii. p. 16.

Formosa, *R. Oldham*.

Distrib. Japan, Corea.

This species is much more slender than, and very distinct from the Cape *G. cartilagineum* (L.) Gaill, with which it has been confounded. Dr. Yendo tells me that in Japan it extends from high-water line, where it occurs as a very short tufted form, down to 12 fathoms, when it is large and graceful and as much as $1\frac{1}{2}$ ft. long.

The fronds do not become terete, as do those of *C. cartilagineum*, but remain thin and permanently flattened. The stichidia occur as small spathulate branches.

G. latifolium, *Born.* in Born. et Thur. Not. Algol. p. 58.

Macao, in herb Hooker.

Distrib. Europe, N. Africa, Atlantic Islands, Japan.

Several dwarf plants of another *Gelidium*, evidently growing near high-water mark, were found by Dr. Boyden, but they are unfortunately too young to determine.

Eucheuma spinosum, *J. Ag.* Sp. ii. p. 626.
Sold at Pekin, *Bretschneider* 203. Formosa, teste Yendo in litt.
Distrib. Indian Ocean, Cape of Good Hope, tropical Australia, New Guinea, Japan.

E. papulosa, *Cotton & Yendo* in Kew Bull. 1914, p. 220.
Formosa, teste Yendo. Sold in China as "Hong-tsay."
Distrib. Red Sea, Somaliland, Japan, Sandwich Islands.
A full account of this algae is given in the *Kew Bulletin* (l.c.). In Japan, where it is used extensively, it is known as "Tosaka," and a certain amount is also exported annually to China.

Gracilaria confervoides, *Grev.* Alg. Brit. p. 123.
Wei-hai-wei, Oct. 1910, *Boyden*, 11. Hongkong, Feb. 1890, *C. Ford* 190.
Distrib. Probably cosmopolitan.
Apparently plentiful in the East.

G. corticata, *J. Ag.* Sp. ii. p. 602.
Macao, in herb. Hooker.
Distrib. Indian Ocean, China, Japan, Corea.

Hypnea seticulosa, *J. Ag.* Sp. ii. p. 446.
Hongkong, March 1890, *C. Ford* 195.
Distrib. Australia, China, Japan.

Delisea japonica, *Okam.* Icones, vol. i. No. 6, p. 139. *D. pulchra*, Okam. Exsicc. No. 19 (non Mont.).
Tamsuy, Formosa, 1864, *R. Oldham*.
Distrib. Japan.

Laurencia papillosa, *Grev.* Syn. p. lii.
Amoy, *R. Swinhoe*; Takow, Formosa, *R. Swinhoe*.
Distrib. Mediterranean, Atlantic Islands, Red Sea, Indian Ocean, Phillipines, Japan, West Indies, Florida.
The West Indian species is apparently the same as the Mediterranean and Red Sea plant, but with such a difficult and little understood genus as *Laurencia* all records must be taken with caution.

Rhodomela subfusca, *C. Agardh*, Sp. i. p. 378.
Chefoo, May 1861, *H. F. Hance*.
Distrib. N. Atlantic and N. Pacific.
This species is listed with some reserve. As it is known from Japan, and has been recorded by Mrs. Gepp from Wei-hai-wei, it appears safe to refer the Chefoo specimen to *R. subfusca*, even though it appears to differ slightly from the more usual European forms.

Gloiosiphonia capillaris, *Carm.* in Berkeley's Glean. Brit. Alg. p. 45.
Chefoo, May 1861, *H. F. Hance*.
Distrib. N. Atlantic (Europe and America), Japan.

Gloiopeltis tenax, *J. Ag.* Alg. med. p. 68.
"China," in herb. Hooker.
Distrib. Japan, Corea, China.

Grateloupia filicina, *Ag.* Sp. i. p. 223.
Wei-hai-wei, Oct. 1910, *Boyden* 4, 7.
Distrib. S. Europe, Indian Ocean, Japan.
Several specimens of a short, delicate, very pinnate form, evidently growing in rock-pools, were forwarded by Dr. Boyden. They closely resemble English specimens. Okamura's plant (Alg. Jap. Exsicc. 32), in the Kew copy at all events, is certainly distinct, and appears to agree with *G. subpectinata*, Holmes.

G. affinis, *Okam.* in Bot. Mag. Tok. vii. p. 100. *Gigartina affinis*, Harv. Char. New Alg. No. 31.
Wei-hai-wei, Oct. 1910, *Boyden* 8.
Distrib. Japan.
A variable plant as shown by Okamura (l.c.), and common in Japan on rocks near high-water line. Two small specimens collected by Dr. Boyden are with little doubt referable to this species.

Lithophyllum zostericolum, *Fosl.* in Kgl. Norske vid Skrift. 1900. No. 3, p. 5.
Wei-hai-wei, Oct. 1910, on leaves of *Zostera marina*, *Boyden* 13.
Distrib. Japan, Corea, N.W. America, California.

Corallina pilulifera, *Post. & Rupr.* Illust. p. 20.
Kelung, Formosa, Feb. 1882, *T. Watters.*
Distrib. Japan, Pacific Coast of N. America, Magellan, New Zealand.

XV.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatarum.

DECAS LXXXV.

841. **Meliosma Mannii,** *Lace* [Sabiaceae]; a *M. simplicifolia*, Roxb., inter alia inflorescentia densiore floribus majoribus recedit.

Arbor 6–15-metralis; ramuli primo puberuli, cito glabri, cortice primo brunneo vel fusco-brunneo mox cinereo-brunneo lenticellis pallidis majusculis conspicue notato obtecti. *Folia* simplicia, oblanceolata vel oblongo-oblanceolata vel rarius oblongo-elliptica, inferne in petiolum gradatim attenuata, apice subito acuminata, acuta, ad 21 cm. longa et 7·5 cm. lata, subcoriacea, supra viridia, nitida, infra pallida, glabra nisi pagina inferiore praesertim ad costam et in nervorum axillis pilis paucis instructa, nervis lateralibus utrinsecus 12–15 supra conspicuis subtus prominentibus, nervulis reticulatis pagina utraque conspicuis, margine integro paulo recurvo interdum undulato; petioli

1–2·5 cm. longi, supra canaliculati, basi incrassati, puberuli. *Paniculae* terminales, densiflorae, puberulae, inferne foliatae; flores albi, 3 mm. diametro, pedicellis 1–2 mm. longis pilis squamiformibus brunneis vel albidis tectis suffulti; bracteae bracteolaeque minutae, ciliatae. *Sepala* plerumque 4, inter se inaequalia, ciliolata. *Petala* glabra, tria exteriora orbicularia, concava, 2·5 mm. lata, duo interiora lanceolata, integra, circiter 2 mm. longa. *Drupa* obconoidea, basi obliqua vel subito contracta, usque ad 6 mm. diametro.

Indo-China. Burma: Maymyo Plateau, 1050 m., a frequent tree on banks of streams, *Lace* 5282, 5371. Assam: Khasia Hills, *Mann* 260.

842. **Acacia Myaingii,** *Lace* [Leguminosae-Mimoseae]; ab affini *A. Harmandiana*, Gagnepain, paniculis glabris facile distinguenda.

Arbor parva; ramuli cinnamomei vel griseo-brunnei, parum costati angulative, lenticellis multis parvis notati, glabri, spinulis stipularibus circiter 2 mm. longis et spinis auctis (in ramulis foliosis) circiter 1·5 cm. longis, omnibus rectis glabris et purpureo-brunneis armati. *Folia* glabra, petiolo ad 2 cm. longo supra late haud alte canaliculato glabro suffulta, rhachi parum excurrente inter pinnas superiores glandula rotundata sessili saepius instructa; pinnae 1–2-jugae, usque ad 6·5 cm. longae, rhachilla magis minusve angulata sulcatave saepius excurrente et inter foliola duo superiora glandula parva sessili orbiculari instructa; foliola plerumque opposita, pinnae cujusque utrinsecus 3–6, oblique oblonga ellipticave, apice minute mucronata, interdum emarginata, basi latere altero anguste cuneata, altero rotundata truncatave, superiora inferioribus majora, 0·5–2·5 cm. longa, 0·2–1·2 cm. lata, coriacea, griseo-viridia, nervis pagina utraque conspicuis; petioluli 1 mm. longi. *Paniculae* terminales, 26 cm. longae, 23 cm. latae, glabrae, ramulis rigidis; flores lutei; capitula 5 mm. diametro, pedunculo 3–10 mm. longo medio vel fere ad medium bracteis in cupulam lobatam connatis ornato suffulta; bracteolae clavatae. *Calyx* 1 mm. longus, glaber, lobis 4–6 plerumque perbrevibus et rotundatis apice inerassatis. *Corolla* 1·5 mm. longa, glabra, lobis 4–6 triangularibus acutis. *Stamina* circiter 50, fere 2 mm. longa, basi plus minusve connata. *Ovarium* glabrum. *Legumina* plana, suturis parum inerassata, apice rotundata, rarius obtusa, basi contracta, 6 cm. longa, 1 cm. lata, glabra, subcastanea, submitida, breviter stipitata.

Indo-China. Burma: Meiktila District; Menyo Reserve, 200 m., *Maung Tha Myaing* 238 (quoad spec. florifera). Wundwin Hills, *English* 21.

Burmese names, Tanaung-net or Tanaung-magyi (ex *My. Tha Myaing*); Su-ma-gyi (ex *English*).

The description of the fruit is taken from English's specimens the leaves of which agree with those on the flowering specimens of Maung Tha Myaing. The latter also collected fruiting specimens without leaves, and the immature pods measure up to 13 cm. long. In view of the good fruiting specimens collected by English it seems doubtful if these longer pods really belong to this species.

843. **Adina indivisa,** *Lace* [Rubiaceae-Naucleae]: ab *A. racemosa*, Miq., cui valde affinis, stipulis integris apice haud bifidis foliis capitulisque majoribus distinguenda.

Arbor usque ad 22 m. alta; ramuli primo puberuli, celerrime glaberrimi, cortice brunneo nitido lenticellato obtecti. *Folia* ovata, apice obtuse acuminata, basi parum cuneata truncatave, quoad magnitudinem egregie variabilia, usque ad 23 cm. longa et 13 cm. lata, chartacea, primo praesertim secus nervos puberula, in nervorum axillis pilosa, nervis lateralibus utrinsecus 9–12 pagina superiore conspicuis inferiore prominentibus nervulis transversis multis conspicuis junctis, margine integra parum undulata; petioli supra canaliculati, 3–6·5 cm. longi, puberuli: stipulae triangulares, acutae, 9 mm. longae, luteo-brunneae, fugaces. *Capitula* in racemos terminales simplices inferne foliatos disposita, pedunculis 2·5–7 cm. longis puberulis suffulta, odiose graveolentia; bracteolae filiformes, minutae, pubescentes. *Receptaculum* pilosum. *Calyx* 2 mm. longus, lobis perbrevibus rotundatis utrinque tomentosis. *Corolla* 8 mm. longa, utrinque puberula; tubi pars tertia superior parum subito inflata; lobi circiter 1 mm. longi, apice fere rotundati, ciliati. *Filamenta* circa 1 mm. longa. *Stylus* glaber, stigmate clavato.

Indo-China. Upper Burma: Maymyo Plateau, 1050 m., *Lace* 5262, 5852, 6151. Myitkyina, Loihpun, 1230 m., *Maung Po Kyaw* 34.

844. **Linociera Beccarii,** *Stapf* [Oleaceae]; affinis *L. macrocarpae*, Knobl., sed bracteis primariis foliaceis reniformibus, fructibus 8-costatis vertice truncatis, costis 2 magis prominulis distincta.

Arbor (?) glabra, ramulis valde compressis lenticellis albidis. *Folia* oblanceolata, subacuminata, basi longe attenuata, 15–22 cm. longa, 6–7·5 cm. lata, coriacea, exsiccando supra fusca, subtus olivacea, nervis lateralibus angulo lato interdum subrecto patentibus sub margine subito prorsus ductis venis nullis vel subnullis: petiolus 2–3 cm. longus, subgracilis. *Flores* ignoti. *Infructescentia* inferne bracteis foliaceis reniformibus 7–8 mm. longis 1–1·2 cm. latis instructa. *Fructus* ellipsoidei, fere 3 cm. longi, circiter 2 cm. lati, 8-costati, costis obtusiusculis, 2 superne magis prominentibus trans verticem truncatum fere concurrentibus, epicarpio fusco, albido-lenticellato.

Sumatra. Province Padang: Ajer mantjoer, 360 m., *Beccari* 826.

845. **Linociera elaeocarpa,** *Stapf* [Oleaceae]; affinis *L. macrocarpae*, Knobl., sed foliis obovatis vel obovato-oblongis apice rotundatis vel obtusis brevissime acuminatis in petiolum longe decurrentibus, nervis lateralibus circiter 12, fructu dactyliformi apice acutiusculo, pericarpio osseo distincta.

Arbor (?) glabra, ramulis compressis parce lenticellatis pallide fuscis. *Folia* obovata vel obovato-oblonga, apice rotundata vel brevissime obtuso-acuminata, basi longe in petiolum crassum attenuata, 20–22 cm. longa, 7–9 cm. lata, coriacea, supra exsiccando fusca, subtus olivacea, nervis lateralibus utrinque circiter 12, angulo lato patentibus, venis nullis:

petiolus 1–1·5 cm. longus. *Flores* ignoti. *Infructescentia*, ut videtur, brevis, fructibus demptis ad 5 cm. longa, pedicellis crassis. *Fructus* oblongo-elliptici, apice acutiusculo, 4 cm. longi, 2 cm. diametro, epicarpio laevi fusco-rubescente, endocarpio osseo, pericarpio toto 5 mm. crasso.

Borneo. Sarawak: without precise locality, *Beccari* 725.

846. **Linociera evenia,** *Stapf* [Oleaceae]; affinis *L. insigni*, Clarke, sed foliis minoribus, ob nervos plane inconspicuos fere eveniis obovato-lanceolatis apiculatis, alabastris minus acutis distincta; a *L. macrocarpa* foliis et calycis segmentis anguste triangulari-lanceolatis recedit.

Arbor (?) glabra, ramis cortice albido tectis, ramulis hornotinis sursum compressis castaneis. *Folia* obovato-lanceolata, apiculata, basi cuneato-attenuata, 8–15 cm. longa, 4·5 cm. lata, coriacea, exsiccando supra subtusque subconcoloria, olivacea vel subcastanea, costa subtus prominente obtusa supra anguste canaliculata, nervis venisque plane inconspicuis; petiolus 1·5–1·8 cm. longus. *Inflorescentiae* pedunculis gracilibus ad 4 cm. longis suffultae, superne puberulae; bracteae infimae lineares, obtusae, ad 3 mm. longae; pedicelli vix 1 mm. longi. *Flores* pauci; alabastra obtusiuscula. *Calyx* 1 mm. longus; sepala ovata, acuta, albo-pilosula. *Corolla* 2·5 mm. longa; tubus subnullus; segmenta oblonga, subacuta; alabastrum obtusiusculum. *Antherae* 2 mm. longae. *Fructus* ignotus.

Borneo. Sarawak: without precise locality, *Beccari* 3301.

847. **Pimelea tenuis,** *Scott* [Thymelaeaceae-Euthymelaeae]: a *P. angustifolia*, R.Br., foliis brevioribus latioribusque, involucri phyllis obtusioribus, perianthii tubo tenuiore, lobis minoribus recedit.

Fruticulus superne virgato-ramosus. *Caulis* leviter rugosus, cinereo-fuscus; ramuli numerosi, glabri (in foliorum axillis pilis paucis albidis sericeis minutissimis exceptis), pallido-fusci, internodiis 1–1·8 cm. longis. *Folia* opposita, sessilia, lanceolata, ad basin attenuata, apice obtusa, 8–9 mm. longa, 2–2·5 mm. lata, marginibus incurvata vel interdum concava et caulem amplectantia, coriacea, glauco-viridia, costa subtus subdistincta. *Capitula* plurima, multiflora, globosa, suberecta demum nutantia, elegantia, 1–1·3 cm. diametro. *Involucri* phylla 4 ovata vel suborbicularia, apice obtusa, 4 mm. longa, 4 mm. lata, extus glabra, intus praecipue in medio pilis albidis sericeis induta, viridia, marginibus alba, costa subdistincta alba. *Perianthii* albi tubus tenuis, pilosus, super ovarium articulatus, super articulationem 0·9–1 cm. longus, 0·75 mm. latus; lobi plus minusve oblongi, apice rotundati, 2–2·5 mm. longi, 1 mm. lati. *Stamina* tubi fauce inserta, lobos aequantia; filamenta tenuissima, 2 mm. longa; antherae oblongae, 0·75 mm. longae. *Ovarium* villosum, 2·5 mm. longum, pilis 1 mm. longis; stylus stamina longitudine aequans; stigma capitatum, glabrum.

West Australia. Nangeenan, *Steward* 113.

Pritzel 1008 is probably a form of this species; its upper leaves agree with those of the type, but the lower ones are linear. It is

to be noted, however, that only the leaves on the young wood are present in *Stoward* 113. In floral characters Pritzel's specimen agrees with the type.

var. **longistyla,** *Scott,* foliis majoribus, perianthio paulum minore, stylo exserto a typo recedit.

Folia conferta, interdum minutissime apiculata, internodiis longiora, majora, 0·8–1·2 cm. longa, 2–2·75 mm. lata, marginibus leviter incrassata. *Involucri* phylla minus obtusa, pallidiora, majora, 6 mm. longa, 5 mm. lata, venis distinctioribus. *Perianthii* tubus brevior, super articulationem 0·75 cm. longus; lobi oblongi, apice rotundati, 2–2·5 mm. longi. *Filamenta* tubi fauce inserta, 0·5 mm. longa; antherae lineares 0·5–0·75 mm. longae. *Ovarium* 2·5 mm. longum, pilis 2 mm. longis; stylus exsertus, perianthio 1–2 mm. longior.

West Australia. Victoria Desert, Camp 57, *R. Helms* (Elder Exploring Expedition).

Some of the differences noted above, *e.g.*, the larger leaves, may be due to the age of this plant, which appears to be only in the first or second year of its growth. Perhaps the short filaments and exserted style should rather be taken as a case of heterostyly—a phenomenon not unknown in the Thymelaeaceae (cf. "The Different Forms of Flowers on Plants of the Same Species," by Ch. Darwin, p. 114).

848. **Brodiaea recurvifolia,** *C. H. Wright* [Liliaceae-Alliceae]; *B. sellowianae,* Baker, affinis, segmentis perianthii angustioribus differt.

Bulbus ovoideus, usque ad 1 cm. diametro. *Folia* synanthia, linearia, obtusa, recurvata, plana, glabra, marginibus minutissime denticulatis, 6 cm. longa, 2·5 mm. lata. *Pedunculus* 2 cm. longus, uniflorus, gracilis; spatha 18 mm. longa, membranacea, biloba; pedicellus 1–3 mm. longus. *Perianthium* album vel dilute luteum; tubus 1·5 cm. longus; lobi elliptici, obtusi, 6 mm. longi, 3 mm. lati, uninerves. *Antherae* sagittatae, 3 mm. longae. *Staminodia* oblonga, 1·5 mm. longa. *Ovarium* subglobosum, loculis 10–12-ovulatis: stylus 1·5 cm. longus; stigma breviter trilobum.

Uruguay: Montevideo, *Arecharaleta* 19, Canelan Chico, *Berro* 5898.

This is quite a diminutive species of *Brodiaea* and has the appearance of a dwarf *Zephyranthes.*

849. **Fimbristylis** (**Trichelostylis**) **Allenii,** *Turrill* (Cyperaceae-Scirpeae); *F. quinquangulari,* Kunth, affinis, sed gracilior, foliis angustioribus brevioribusque, glumis apice rotundatis apiculatis margine membranaceis ciliolatis recedit.

Planta annua, erecta, gracilis, glabra, culmis 3 dm. altis, usque ad 3 cm. supra imam basem vagina aphylla tectis. *Folia* omnia basalia, anguste linearia, acutissima, 5–7 cm. longa, 1 mm. lata, margine leviter scabrida, glabra, plus minusve recurva. *Inflorescentia* multispiculata, laxa, circiter 6 cm. longa et 5 cm. diametro; bracteae valde vaginantes, 3 mm. longae; spiculae cylindrico-ellipsoideae, multiflorae, 5 mm. longae, 2 mm. dia-

metro. *Glumae* late oblongo-ovatae, apice rotundatae, apiculatae, 2·5 mm. longae, 2 mm. latae, margine membranaceae, ciliolatae. *Stamina* 3, filamentis 3·5 mm. longis, antheris linearibus 1·75 mm. longis. *Ovarium* obovoiedeo-cylindricum, glabrum; stylus ramis tribus 1 mm. longis inclusis 2·25 mm. longus, dense hispidus. *Nux* obovoidea, indistincte trigona, 0·7 mm. alta, usque ad 0·5 mm. diametro, nigro-glaucescens.

Australia. Northern Territory; near Darwin, wet land, *C. E. F. Allen* 170.

850. **Fimbristylis (Trichostylis) compacta,** *Turrill* (Cyperaceae-Scirpeae); *F. capitatae*, R.Br., affinis, sed foliis latioribus longioribus margine ciliatis, inflorescentiis amplioribus, nucibus majoribus distinguenda.

Planta erecta, culmis usque ad 6·5 dm. altis striatis inferne glabris superne scabridulis et leviter pubescentibus basem versus vaginis aphyllis tectis. *Folia* omnia basalia. linearia, apice acuta, usque ad 2·8 dm. longa et 3 mm. lata, margine valde cartilaginea, ciliata. *Inflorescentia* e spiculis in capitula aggregatis constituta, capitulis usque ad 9 plus minusve laxe dispositis; spiculae breviter ovoideae, 5 mm. longae, 3·5 mm. diametro. *Glumae* late oblongae, apice rotundatae, apiculatae vel inferiores arista 1 mm. longa e dorso oriente instructae, 3 mm. longae, 2·5 mm. latae, ciliatae, superne brunneo-maculatae. *Stamina* 3, filamentis 4 mm. longis, antheris linearibus 1·5 mm. longis apice breviter coronatis ciliatisque. *Ovarium* cylindrico-obovoideum; stylus ramis tribus 2·5 mm. longis inclusis 4 mm. longus, inferne hispidus. *Nux* late obovoidea, inconspicue triangularis, 0·75 mm. longa, 0·75 mm. diametro, superficie tota minute tuberculata, fere alba.

Australia. Northern Territory; in swamp near Darwin. *C. E. F. Allen* 174; in gorge Pine Creek, near Darwin, *C. E. F. Allen* 103.

XVI.—MISCELLANEOUS NOTES.

Mr. J. Aikman and Mr. A. D. Cotton, F.L.S., Assistants, Second Class, in the Royal Botanic Gardens, Kew, have been promoted to the grade of Assistant, First Class, with effect from April 1.

We learn that Mr. W. W. Pettigrew, formerly a member of the gardening staff of the Royal Botanic Gardens, and lately Chief Officer of Parks and Open Spaces, Cardiff, has been appointed Superintendent of Parks under the Manchester Corporation, and that Mr. A. A. Pettigrew, also formerly a member of the gardening staff of the Royal Botanic Gardens, has been appointed Chief Officer of Parks and Open Spaces, Cardiff, in succession to his brother.

Retirement of Mr. G. Massee.—By the retirement of Mr. G. Massee on March 31st, under the age limit, the Herbarium loses

one of the best known and most active members of its staff. Mr. Massee joined the Kew staff in 1893, when he was appointed Principal Assistant (Cryptogams), which post became later one of the "First Class Assistantships," so that he has the distinction of having been a senior officer during the whole of his official career.

A Yorkshire man by birth, Mr. Massee left his native village of Scampston when about 10 years old, for the city of York, in order to complete his education. Besides adventure, two things attracted him, namely, painting and botany. One may safely say that in all three he achieved success. After some exciting experiences in the West Indies and South America he settled down to more serious work at home, returning to his old hobby, botany, and specialising on fungi and plant diseases. For some years he worked privately at Kew, and in 1893 succeeded Dr. M. C. Cooke in charge of the Crytogamic Department in the Herbarium.

Previous to his appointment Mr. Massee had published several important morphological and systematic papers, and in 1891 his book *British Fungi, Phycomycetes and Ustilagineae* appeared, whilst the following year saw the production of his *Monograph of the Myxogastres*, in which his skill as an artist, already known through his work in Spruce's *Hepaticae Amazonicae et Andinae*, became further evident. In the same year the first volume of his *British Fungus Flora* was issued. The four volumes which were published, at once became, and have remained, a standard work, and it is much to be regretted that it was found impossible to issue the remaining parts.

Previous to 1899 there were only two books on plant diseases available for English students, namely, Mr. Worthington G. Smith's *Diseases of Field and Garden Crops* and Dr. William G. Smith's very useful translation of von Tubeuf's *Pflanzen-krankheiten*. The former was limited in its scope, and the latter scientific rather than economic. Mr. Massee attacked the subject from the practical standpoint, including at the same time a wide range of host plants, and the appearance of his work, *A Text-book of Plant Diseases*, in 1899, marks an epoch in the history of the subject in this country. The book was hailed with delight both by growers and botanists, and a second edition was issued in 1903. Through it the author came into touch with pathologists in all parts of the world, a fact which incidentally led to a heavy increase of work in the Cryptogamic Department. Many papers and articles followed, and in 1910 his other well-known book, *Diseases of Cultivated Plants and Trees*, was issued. In 1902 he received the V.M.H. of the Royal Horticultural Society.

In spite of his activity in the field of pathology Mr. Massee found time to produce books on systematic mycology, a very concise but useful synopsis of European Agaricaceae appearing in 1902, and nine years later the less severely technical volume, *British Fungi and Lichens*. In 1906 he published a more general work entitled *A Text Book of Fungi*, and in 1913, in conjunction with his daughter, Miss Ivy Massee, the volume *Mildews, Rusts and Smuts*.

For an idea of Mr. Massee's personal characteristics no better

sketch could be wished than the graphic article which appeared in the *Journal of the Kew Guild* for 1908. With regard to his literary labours he knows well what it is to burn the midnight oil, feeling, he always says, in his best mood for writing when every one else has retired. One is perhaps most impressed with his extraordinarily wide knowledge of fungi, and his intuition in detecting an awkward and deceptive specimen, though one is continually struck afresh with the excellence of his bold and beautiful drawings. Mr. Massee has a keen sense of humour, and to be in his company relieves even systematic botany of all dullness. The scathing denunciations in which he is apt to indulge are not meant to be taken seriously, and those who know him well welcome his candid and often pungent criticism. A weak spot in an argument is sure to be exposed, and as Mr. Massee attacks each branch of botany in turn it is probable that many of the younger Kew botanists owe him a secret debt of gratitude. He will be much missed by all his colleagues, and he takes with him their best wishes for long continued health and happiness.

A. D. C.

William Granger.—With the death of Mr. William Granger at Richmond on the 12th of March, at the ripe age of 86 years, there has passed away one of the oldest and most respected servants of the Royal Gardens. Granger entered the Kew service so long ago as June, 1850, and even before that date he had served the State for eight years in the Royal Navy—a training that evidently gave him a life-long character for neatness and accuracy in all that he undertook, a proof of which is shown by the various posts he held, such as office keeper, clerk to the curator, and finally storekeeper. For some time a part of his duty was to check the men's time as they entered and left the Gardens, either in the early morning or at meal times, and a kindly given warning word from Granger as to any slackness or irregularity as to time, was always effectual, as the men realised that such a warning was given only for their own welfare. Besides this the interest and sympathy he always had for them in times of affliction had a marked effect, and cannot be better expressed than by quoting the following paragraph from a notice of his retirement, in the *Journal of the Kew Guild* for 1893. "It is difficult adequately to express the feeling with which he has always been regarded by Kew men; that feeling, however, is one of deep respect and esteem, it would scarcely be too much to say, of affection. Only those who have lived and worked at Kew can appreciate the peculiar position he has occupied in the establishment, and the great moral influence he exerted over the men, many a new-comer having had reason to be thankful for his advice and encouragement."

The neatness and order of his work generally was reflected in his personal appearance and home life in one of the houses on the north side of Kew Green, so that the rooms he let were seldom or never empty. When the writer of this notice arrived at Kew in 1858, he found Mr. Allan Black, Curator of the Herbarium,

residing there, and the rooms were afterwards occupied by Mr. Donald McLeod, Assistant Curator of the Gardens. Granger retired from service at Kew under the age limit, in 1893, receiving a small pension. For many years he held the position of parish clerk at Kew Church.

J. R. J.

Pathological Laboratory.—The work of the Royal Botanic Gardens, Kew, has been widened by the establishment of a Pathological Laboratory for investigation and research into diseases of plants caused by fungi.

Two cottages on Kew Green, formerly known as Gumley and Chestnut Cottages, have been acquired and fitted up as a research laboratory. The cottages now united were originally in connection, and were used, it is believed, as residences for ladies of the bedchamber when Queen Charlotte occupied Kew Palace. Some of the ceilings are interesting examples of XVIIIth century plaster work.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the Bulletin:—

Messrs. James Veitch and Sons, Coombe Wood.—Section of wood of *Davidia involucrata*.

Imperial Commissioner of Agriculture for the West Indies.—A collection of photographs of West Indian Trees, also views in the Botanic Gardens, Antigua and St. Vincent.

Mr. R. N. Rogers, Carwinion, Falmouth.—Sections of wood of *Thuya plicata* and naturally grafted branches of Holly.

The Earl of Ducie, Tortworth Court, Gloucester.—Specimens of cladoptosis of branches of *Quercus Mirbeckii*.

Director, Botanic Gardens, Brisbane.—Section of stem of *Millettia megasperma*.

Mr. J. Gribble, Penzance.—Section of stem of *Eucalyptus Globulus*.

Mr. W. Schway Thwin, Moulmein, Burma.—Specimen of dried plant and oil of *Cymbopogon Nardus*.

Forestry Officer, Georgetown, British Guiana.—Ten photographs of British Guiana Palms, &c.

Curator, Botanic Gardens, Dominica.—Sample of Chicle Gum extracted from a tree of the "Naseberry" or "Sapodilla Plum" (*Achras Sapota*).

Director, Botanic Gardens, Singapore.—Sections of wood of *Calophyllum ferrugineum* and *Castanopsis Hullettii*.

Messrs. William Duncan and Son, Buckie.—Turned articles made of the wood of the "Yew" (*Taxus baccata*).

St. Vincent Permanent Exhibition Committee.—Seventeen photographs descriptive of the Cotton Industry of St. Vincent.

Mr. Donald Gunn, London, W.—Walking sticks of *Robinia Pseudacacia* and of "Square Bamboo" (*Bambusa quadrangularis*).

Mr. C. Garrett, Bedford Park, W.—Abnormal fruit of "Orange" (*Citrus Aurantium*).

Mr. C. S. Persichetti, Westminster.—Stems of *Spartium junceum* and fibre extracted from the same.

Curator, Botanic Station, Seychelles.—Photographs of germinating "Coco de Mer" (*Lodoicea sechellarum*).

Mr. J. Campbell, Raheny, Ireland.—Nest of baskets made by Malacca Malays from the split leaves of a species of *Pandanus*.

J. M. H.

The genus Honckenya.—When describing the monotypic African tiliaceous genus *Cephalonema* for Hooker's Icones Plantarum (t. 3002), the writer had to examine the species of *Honckenya* in order to discover the characters distinguishing the two genera. These may be summarized as follows:—

Honckenya. Flowers purplish; capsule terete, bristly all over, the loculi divided by incomplete transverse septa between the seeds; tertiary nerves of the leaves not very regular.

Cephalonema. Flowers yellow; capsule winged, bristly on the margins of the wings, the loculi not divided; tertiary nerves of the leaves straight and parallel.

Three species of *Honckenya* have been described. *H. ficifolia*, Willd., the type of the genus, is common in West Africa, from Senegambia to Angola, and extends eastwards to Uganda. It is an important indigenous fibre plant.* Good figures of it are given in Delessert, Icones, vol. v. t. 1, and in Bot. Mag. t. 7836. The anthers are H-shaped, the lobes being free at both ends and joined for a short distance in the middle by the connective.

The other two species are comparatively little known. *H. minor*, Baill.,† was based on a specimen collected at Axim, on the Gold Coast, and preserved in the Paris Herbarium. It is not represented by authenticated specimens in the Kew Herbarium. According to Baillon, it resembles certain species of *Triumfetta* in general appearance and in the fruit, and differs from *H. ficifolia* in the smaller size of all its parts, the presence of relatively long simple hairs on the leaves in addition to stellate ones, and in the ellipsoid anthers. Mature seeds are not known.

H. parva, K. Schum.,‡ was based on specimens collected at Monrovia, Liberia, by E. H. L. Krause, and is represented at Kew by a portion of the type as well as by specimens collected in Sierra Leone by Scott Elliot and Smythe. According to Schumann it resembles *Triumfetta procumbens*, Forst., in habit, and differs from *H. ficifolia* in the small leaves clothed with simple hairs on both surfaces, and the tuberculate seeds. The young leaves have short stellate hairs in addition to long simple ones, and the anthers are elliptic-oblong in outline (*Scott Elliot* 3915).

Honckenya minor and *H. parva* thus appear to differ in the same characters (as far as these are known) from *H. ficifolia*; and since no material differences have been discovered in the descrip-

* Kew Bull., Add. Ser. ix. p. 107.
† Adansonia, vol. x. p. 183 (1872).
‡ Engl. Jahrb. vol. xv. p. 115 (1892).

tions of *H. minor* and *H. parva*, it is possible that they are conspecific.

T. A. S.

Lepidium oxytrichum.—In 1852 F. Mueller gave the name *Lepidium papillosum* to a new species collected by him in South Australia.* This was characterised by a dense clothing of white clavate papillae on the stem and branches, and by a narrow straight-sided sinus at the apex of the silicle. In a second account published in 1879 he described the stem and branches as being covered with very short spreading turgid, almost vesicular hair.† *L. papillosum* is represented in the Kew Herbarium by a type-specimen from Crystal Brook, South Australia, and by two plants collected in New South Wales and South Australia by Cunningham and Wheeler respectively.

The plants described by Thellung‡ under this name belong to a distinct species which has the stem and branches densely hirsute with slender linear-subulate hairs, and a triangular sinus at the apex of the silicle. For this species the name *Lepidium oxytrichum* is now proposed. Its synonymy and distribution are as follows:—

Lepidium oxytrichum, *Sprague*, nom. nov. *L. papillosum*, Thellung, Die Gattung Lepidium, pp. 276, 288 (1906), non F. Muell.

Australia. South Australia: between Stokes' Range and Cooper's Creek (mixed with *L. papillosum*), *Wheeler;* Mt. Lyndhurst, *Mar Koch* 199, 200. Western Australia: without precise locality, *Ince.*

Thellung also records the species from "New South Weles: Mt. Brown, *Walter.*"

The distribution of *L. papillosum*, F. Muell., is Queensland.§ New South Wales, Victoria,‖ and South Australia.

T. A. S.

Melochia ulmifolia.—Two species of this name are recorded in the Index Kewensis as having been published in 1842, one a native of Guiana and Northern Brazil, described by Bentham in Hook. Journ. Bot. vol. iv. p. 129, the other a native of Central Brazil, described by St. Hilaire and Naudin in Ann. Sc. Nat., Sér. 2, vol. xvii. p. 36. Schumann, when monographing the *Sterculiaceae* of Brazil in 1886, retained the name *Melochia ulmifolia* for the latter, and re-named Bentham's species *M. Benthami.*¶ R. E. Fries in his Studies on American Columniferae, pointed out that Bentham's species had been described under the names *Riedleia ramuliflora*, Miq., in 1847, and *Riedleja? dichotoma*, Turcz., in 1858; and he accordingly pro-

---

* Linnaea, vol. xxv. p. 370.
† Native Plants of Victoria, p. 37.
‡ Die Gattung Lepidium, pp. 276, 288 (1906).
§ Bailey, Queensl. Fl. p. 52.
‖ Native Pl. Victoria, p. 37.
¶ Mart. Fl. Bras. vol. xii. pars 3, p. 40 (1886).

posed for it the new combination *Melochia ramuliflora*, R. E. Fries.*

Both the above-mentioned periodicals were, however, published in monthly parts; and Bentham's species appeared in the Journal of Botany for August, 1841,† whereas St. Hilaire and Naudin's was published nearly a year later in the Annales des Sciences Naturelles for July, 1842.‡

The name *Melochia ulmifolia*, Benth., should therefore be retained, and a new one is required for *M. ulmifolia*, St. Hil. and Naud. The name *Melochia Gardneri* is now proposed for it.

Melochia Gardneri, *Sprague*, nom. nov. *M. ulmifolia*, St. Hil. & Naud. in Ann. Sc. Nat. Sér. II. vol. xvii. p. 36 (1842): K. Schum. in Mart. Fl. Bras. vol. xii. pars 3, p. 36; non Benth.

Brazil. Goyaz: in woods on the Serra de Santa Brida, April 1840, *Gardner* 3608.

M. Gardneri is described by the collector as a shrub, 6–8 ft. high.

T. A. S.

Botanical Magazine for February.—The plants figured are *Tillandsia Regina*, Vell. (t. 8596); *Mormodes tigrinum*, Rodr. (t. 8597); *Rhododendron moupinense*, Franch. (t. 8598), and *Eugenia uniflora*, Linn. (t. 8599). The *Tillandsia* has been in cultivation for more than half a century and has borne a variety of names including *Vriesia Regina*, Antoine, and *V. Glazioviana*, Lem. It is a native of the forests of the provinces of Rio de Janeiro and San Paulo in Southern Brazil, and as known in gardens its flowers are variable in colour, sometimes being white, sometimes yellow, while in some instances there is a change from white to yellow during the flowering period. Its leaves, arranged in a large rosette, are $3\frac{1}{2}$–$4\frac{1}{2}$ feet long and 3–4 inches broad, and the densely bracteate peduncle is $3\frac{1}{2}$ feet high, bearing a panicle of about the same length. The plant from which the material for the figure was obtained was grown in the Mexican section of the Temperate House at Kew, where it flowered in May, 1912, being then about thirty years old. It died soon afterwards.

Mormodes tigrinum is striking in the colour of its medium-sized flowers of which the sepals and petals are densely blotched with purple on a paler ground, while the lip is yellow and bears numerous brown spots. The species inhabits forests in the region of the Upper Amazon, and was first introduced to cultivation about 1890 by Messrs. Sander and Sons, in whose establishment at St. Albans a plant flowered in that year. The Kew plant, which flowered in February, 1914, and which furnished the material for the figure, was purchased from Messrs. Sander, who received it in a recent importation from Mr. Forget. The genus is closely allied to *Catasetum*, from which it may be distinguished by having hermaphrodite flowers and a lip which is obliquely twisted to one side.

---

* Svensk. Vet. Akad. Handl., N.S., vol. xlii. No. 12, p. 11 (1908).
† See foot of p. 113.
‡ See foot of p. 17.

The *Rhododendron* is a Western Chinese species and grows at altitudes of 6000–10,000 feet above sea-level. Originally found by the late Abbé David in the neighbourhood of Moupine, Szechuan, in 1870, its appearance in the living collections at Kew results from seeds received from the Arnold Arboretum for which they were collected in 1908 by Mr. E. H. Wilson, who met with the species growing as an epiphyte, often on evergreen oaks and other broad-leaved trees, on Mount Omi and on neighbouring mountains. It is of dwarf habit, suitable for the rock-garden, and flowers when only a few years old. Amongst the species of the section *Lepidorhodium* it is easily recognised by the subverticillate somewhat cordate glandular leaves, the large leafy calyx, the black-pilose twigs and petioles, the large white corollas spotted with red on the inside of the upper part of the tube, and by the large carmine anthers.

The *Eugenia*, under the name of *Plinia pedunculata*, Linn., was illustrated in the Botanical Magazine as long ago as 1799 (t. 473), but that illustration does not show the edible brightly coloured fruits, which are not always obtained on cultivated plants. It appears to have been grown in the Apothecaries Garden, Chelsea, in 1759. The species is a native of tropical South America, and is cultivated in most warm countries. As *Eugenia Michelii*, Lamk., the plant from which the material for the figure was prepared was presented to Kew by the Director of the Jardin Colonial, Paris, and grown in the Palm House; it fruited freely in May, 1914.

Botanical Magazine for March.—The plants figured are *Cirrhopetalum Fletcherianum*, Rolfe (t. 8600); *Rhododendron stamineum*, Franch. (t. 8601): *Pinguicula gypsicola*, T. S. Brandegee (t. 8602), and *Lotus campylocladus*, Webb et Berth., forma *villosior*, Sprague (t. 8603).

The Cirrhopetalum is a recent introduction from New Guinea, whence it was first imported to England by Messrs. Hugh Low & Co., of Enfield. A plant acquired by the Rev. J. C. B. Fletcher, Mundham Vicarage, Colchester, was exhibited last year at a meeting of the Royal Horticultural Society under the name of *Bulbophyllum Fletcherianum*. The drawing was made from a water-colour sketch of the plant and a single flower presented by Mr. Fletcher, and from a living plant lent to Kew by Messrs. Stuart Low & Co. It is a remarkable species, having long pendulous leaves resembling those of *Phalaenopsis Schilleriana* and large flowers suffused and blotched with purple.

Rhododendron stamineum belongs to the small section *Chomiastrum*, the species of which are distinguished by having their flowers produced from axillary buds, which are crowded at the ends of the branches. With this character are always found eglandular persistent leaves and long funnel-shaped corollas. From its allies, *R. stamineum* may be recognised by its long, far-exserted stamens. For its introduction to cultivation we are indebted to Messrs. James Veitch & Sons, who received it in 1900 from their collector, Mr. E. H. Wilson, by whom it was met with in rocky shady ravines in Western China. Its leaves are ovate-

lanceolate, 2–4 inches long, and the fragrant flowers, white with some yellow at the base of the upper lip, are arranged in loose clusters. The material used for the figure was furnished by Mr. J. C. Williams, in whose fine garden at Caerhays Castle, Gorran, Cornwall, a plant flowered in April, 1914.

The Mexican *Pinguicula* has rather showy purple flowers, and is particularly interesting owing to the variability of its leaves. As is usual in the genus these are in a basal rosette. At the time of flowering they are linear, two inches or so in length, and are widened at the base. After the flowering season the long leaves gradually die off centripetally, and at the crown a compact rosette, about $\frac{3}{4}$ inch across, resembling those of some species of *Sempervivum*, develops and entirely replaces the rosette of long leaves. The small rosettes persist through the winter and are succeeded in the same manner by the rosettes of long leaves. This *Pinguicula* was discovered by Dr. Purpus in 1910, growing on wet gypsum rocks at Minas de San Rafael, in the State of San Luis Potosi, and the Kew plant was obtained by purchase in 1912 from Mr. R. Graessner, of Perleberg.

Lotus campylocladus is a compact-growing herb about a foot high with silvery leaves and pleasing yellow flowers, marked with red streaks and arranged in rather long-stalked umbels. It is a native of the Canary Islands. The form figured, raised at Kew from seeds presented by Dr. G. V. Perez, of Orotava, differs from the type in having stems, leaves and calyces spreading-villous, and in having longer leaflets. The plant does not promise to be hardy at Kew.

Botanical Magazine for April.—The plants figured are *Thunbergia Gibsonii*, S. Moore (t. 8604); *Rhododendron Davidsonianum*, Rehder & Wilson (t. 8605); *Primula Miyabeana*, Ito & Kawakami (t. 8606); *Acanthopanax leucorrhizum*, Harms (t. 8607) and *Iris Urumovii*, Velenovsky.

The *Thunbergia* is a native of tropical East Africa, where it grows at an elevation of 8000 ft. The limb of the corolla is a deep orange colour and of a waxy consistence, and the species is thereby distinguished from its nearest ally, the well-known *T. alata*, Boj. The plant was exhibited in 1913 at an exhibition of the Royal Horticultural Society by Mr. W. van der Weyer, Corfe Castle, Dorset, who was responsible for its introduction to this country.

Rhododendron Davidsonianum is one of the new Chinese species brought into cultivation through the efforts of Messrs. E. H. Wilson and J. Veitch & Sons, having been raised at Coombe Wood from seeds collected by Wilson in 1903-4. It occurs plentifully in Western Szechuan and is apparently most nearly allied to *R. ambiguum*, Hemsl., from which it may be distinguished by the more elegant habit, smaller leaves and differently coloured flowers.

Primula Miyabeana belongs to the *Candelabra* section of the genus, the members of which are natives of eastern and south-eastern Asia. They live in moist meadows and are distinguished by their rosettes of leaves like the primrose and tall flower scapes with superimposed tiers of flowers. Our species belongs to the

sub-section with purple flowers, and is nearly allied to *P. Poissoni*, Franch., but is readily distinguished from this and all other members of the section *Candelabra* in having the calyx farinose within. *P. Miyabeana* is endemic in Formosa, and was raised at Kew in 1913 from seed collected by Mr. W. R. Price on Mount Morrison, Formosa, at 7000 ft. elevation.

The Araliad which forms the subject of t. 8607 was originally described by Prof. Oliver from specimens discovered by Prof. A. Henry in Hupeh, Central China. Mr. Wilson again found it, and through his agency its introduction to cultivation is due to Messrs. J. Veitch & Sons. The species was first referred to *Eleutherococcus*, but Dr. Harms has placed it in the older genus *Acanthopanax*, since there are no grounds for separating the two genera. According to Henry the bark of the roots is used as a drug in China.

Iris Urumovii receives its name from its discoverer, Prof. J. K. Urumov, by whom it was found at Eski Dzumaja, in Bulgaria, in 1901. It has been referred by Dykes to *I. Sintenisii*, Janka, but is now found to be distinct owing to the glaucous leaves with white asperites on the nerves, the lax spathes and the shorter perianth-tube.

Briar Wood for Pipes.—An idea of the importance of briar wood for the manufacture of tobacco pipes can be gathered from a note that appeared in the Diplomatic and Consular Report, No. 5111, Annual Series, 1913, p. 6, dealing with the trade of Corsica for 1912. For many years past briar wood has been exported in considerable quantities from Sicily, Calabria, and other places, but Corsica now appears to have developed a flourishing business likewise. The above-mentioned note refers to the wood as follows:—"Corsica seems to have an almost unlimited quantity of briar roots, and there is no reason why the industry of cutting them up for tobacco pipes should not continue to flourish. The quality of the Corsican roots is excellent, and is very little behind Sicilian briar wood. The pipes are not finished in Corsica, the roots only being cleaned and sawn into small blocks. Up to the present time nearly all the blocks have been shipped to St. Claude, but during the year under review 523 tons were shipped to other countries, the United Kingdom taking 250 tons of this amount. The price of the roots has risen considerably, some six years ago it only being $2\frac{1}{2}$ fr. the 100 kilos., whereas at present it is 5 fr. 60 c."

Briar wood is obtained from the tree heath (*Erica arborea*), and the pipe blocks are cut from nodules which form on the roots. These nodules are very hard and vary considerably in size, many being from 9 to 12 inches in diameter. The burr-like character of the wood presents a singular appearance by reason of the twisted fibres, and when filled and polished is often very beautiful. *E. arborea* is known as a large bush 15 to 20 ft. high, with tiny dark green leaves, and in March and April as a decorative flowering plant of the first quality, the small, fragrant white blossoms being produced with the greatest freedom. It succeeds well in the south of England, and several large masses

of plants 5 or 6 ft. high are amongst the most prominent floral effects at Kew during the spring months. In a few gardens plants are to be found approaching a height of 20 ft., but as a rule the maximum height is not attained here. There appears to be some doubt whether the root nodules are produced in this country, the thorough examination of the roots of old plants being too risky an operation to undertake unless the plants are to be destroyed. In Museum No. 1, a series of nodules and pipe blocks made from this wood may be seen.

The English name "Briar" is a corruption of the French word "Bruyère," meaning heath.

W. D.

Mahonia confusa.—In *Kew Bulletin*, 1914, Mr. Sprague points out (p. 232) that C. K. Schneider, in his enumeration of the Asiatic species of *Mahonia*, has left out *M. confusa* and referred one of the type specimens of this species to *M. Fortunei*. Schneider also appears to have re-described *M. confusa* as a new species, *M. Zemanii*, from a fruit-bearing specimen collected by Wilson (Sargent, Pl. Wilson. vol. i. p. 378). I have not had the opportunity of examining the type of *M. Zemanii*, but have no doubt of its identity with *M. confusa*, judging from his description and notes (l.c. p. 379). Schneider also mentions in his notes that a specimen collected by Henry (no. 3351), which consists of three leaves only, resembles his *M. Zemanii*. I have not been able to examine this particular specimen, but Henry's No. 3351A actually represents *M. confusa*, and is one of the type specimens.

M. confusa differs from its nearest ally *M. Fortunei* not only by the character of the terminal leaflet and of the basal pair, as pointed out by Sprague and by Schneider respectively, but also in having the petal bifid at the apex and the stamen, with a broad, nearly flat connective, whereas in the other species the petal is entire, and the connective apiculate-triangular.

H. T.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 4] [1915

XVII.—SOME ADDITIONAL SPECIES OF MECONOPSIS.

(With Plates.)

In 1894 the writer had to undertake the task of arranging the material of the natural family *Papaveraceae* communicated by various collectors to the herbarium at Calcutta subsequent to the revision of the Indian species published by Sir Joseph Hooker in 1872.* This material included several previously uncharacterised forms of *Meconopsis*, one of which is so distinctive that it was possible to provide a description at once.† In the case of the others, relationship with various described species was manifest; the publication of these was therefore deferred till they could be compared with certain types in other herbaria, notably Kew and Paris. While in Paris in 1895 the writer received much help from the late Mr. Franchet, who, with great kindness, deferred the work on which he was engaged, in order that he might take part in a critical comparison of the Himalayan with the Chinese species of this genus. The results of this study were published in 1896.‡

Ten years later the writer was asked to prepare a digest, intended primarily for the information of cultivators, of the known species. This digest was issued in 1906.§ It had hardly appeared before its incompleteness was demonstrated by the communication of material of a new form from South-Western China, which was published in 1907.‖ Later in the same year it was necessary to describe yet another new species ¶ from the same general area.

* Flora of British India, vol. i. pp. 116-119.
† Journal of the Asiatic Society of Bengal, vol. lxiii. part 2, p. 82.
‡ Journal of the Asiatic Society of Bengal, vol. lxiv. part 2, pp. 309–321.
§ Annals of Botany, vol. xx. pp. 323–367.
‖ Transactions and Proceedings of the Botanical Society of Edinburgh, vol. xxiii. p. 258.
¶ Kew Bulletin, 1907, p. 316.

(3827.) Wt. 153–601. 1,125. 5/15. J.T. & S. G. 14.

Two years afterwards the genus *Meconopsis* was dealt with by Dr. F. Fedde in the *Pflanzenreich*.* This authoritative revision, though published in 1909, does not bring our knowledge of the species beyond 1906; from a footnote under the key to the species it seems possible that the monograph in the *Pflanzenreich* had, except as regards that key, been completed before the paper in the *Annals of Botany* appeared.

Some difference of judgment in two independent revisions is inevitable. The more important in this case may be mentioned. In the *Pflanzenreich* it is suggested that *Cathcartia*, Hook. f., should perhaps be included in *Meconopsis;* the reduction has not, however, been effected. In the *Pflanzenreich*, too, the sections of the digest in the *Annals of Botany* are treated as subgenera, while the groups of allied species indicated in the same place are treated as sections. In one case, what was considered in the digest of 1906 to be a variety appears to be advanced in the *Pflanzenreich* to the position of a species; and in a particular instance a critical specimen issued by Wallich in 1830 without a specific name has been included in one species by Dr. Fedde, in another by the writer.

During the decade 1894–1904 the interest taken by cultivators in the genus *Meconopsis* had been mainly confined to the Himalayan forms. About 1903 a number of Chinese ones previously unknown in gardens were introduced, and the old interest in certain Indian species became transformed into something approaching enthusiasm for the genus as a whole. This enthusiasm is largely responsible for the marked increase in our knowledge of the genus which has taken place during the decade 1904-14. The revisions of 1906 embody the first-fruits of that enthusiasm, but the time has already come for a succinct statement of the results which have attended further observation in the field and further experience in the garden. Some conception of what has happened may be gathered from the circumstance that whereas the number of species known in 1896 was 23 and in 1906 was 27, this number is now 40,† whilst at least one very striking hybrid form has been artificially raised.‡ As a consequence, it is necessary once more to provide a key to the species, for the assistance especially of those engaged in their cultivation.

Before doing this, however, some reference is called for to the suggestion of Dr. Fedde that *Meconopsis* and *Cathcartia* might, perhaps, be united. There is much to be said in favour of the suggestion, and there is more to be urged on its behalf now than there was in 1909.

The difficulties which attend the delimitation of genera in *Papaveraceae* are well-known; a single concrete illustration may suffice. Bentham and Hooker, in the *Genera Plantarum*, have

---

* Das Pflanzenreich, 40 Heft [IV. 104], pp. 247–271.

† This is exclusive of three species which, both in the *Pflanzenreich* and in the *Annals of Botany*, are included in *Cathcartia*, and of at least one, perhaps two more, known from incomplete material collected by Captain F. M. Bailey, which have come to hand while this paper was passing through the press, and are here treated tentatively under two known forms.

‡ Gardeners' Chronicle, 1911, vol. I. p. 22, fig. 14.

adduced reasons for the belief that *Hylomecon*, Maxim., and *Dicranostigma*, Hook. f. & Thoms., may conveniently be included in *Stylophorum*, Nutt. In the *Pflanzenreich* all three are once more regarded as distinct genera. The relationship to each other of *Papaver*, Linn., *Meconopsis*, Vig., and *Cathcartia*, Hook. f., resembles that which subsists between the other three genera mentioned. The afterthought which has led Dr. Fedde to refrain from formally including *Cathcartia* in *Meconopsis* thus has the advantage of according similar treatment to two parallel groups of types.

When Viguier, in 1814,* first segregated *Meconopsis* from *Papaver*, in which it had been included by Linnæus, he did so because the ovary of *Meconopsis* has a style but no apical disk. The latter consideration was from the first a subordinate one, because certain species of *Papaver* in which there is no proper disk were already known. Now, we have become acquainted with species of *Meconopsis* which possess a well-developed apical disk, and with others in which the style is obsolete. So completely have the individual characters originally relied upon for the discrimination of these two genera broken down, that one competent authority has formally reunited *Meconopsis* with *Papaver*.† Nevertheless, by the use of the salient differential characters in combination, instead of individually, it is still possible to keep *Meconopsis* and *Papaver* apart.

When Hooker in 1851 first established the genus *Cathcartia*‡ its separation from *Meconopsis* was easy. No *Meconopsis* then known has a sessile or sub-sessile stigma; every *Meconopsis* then known has a capsule which opens when ripe only by short apical valves like those of every *Papaver* in which the capsule is dehiscent at all. The most striking difference between the species on which the genus *Meconopsis* was based and that which constitutes the type of the genus *Cathcartia* is met with in their stigmas. The stigma of that *Meconopsis* is clavate with decurrent subcontiguous rays; the stigma of the original *Cathcartia* is depressed with stellately divaricate rays situated on the margins of compressed laminæ. This *Cathcartia* stigma is comparable with the *Papaver* disk; the difference between the two is that in *Cathcartia* the disk segments are plicate, in *Papaver* they are explanate. From the first, however, this difference in stigma was a subordinate feature in the diagnosis of *Cathcartia* from *Meconopsis*. The latter genus already included a species, *M. simplicifolia*, with a stigma of the *Cathcartia* type,§ though at the apex of a distinct style in place of subsessile as in *Cathcartia villosa*. Now, other five species of *Meconopsis* are known to possess such a disk as occurs in *Cathcartia*: two of these have a style like that of *M. simplicifolia*, the other three have no style. In 1876 one of the three in which the stigma is sessile was, when first described,

* Hist. Pav. Diss. p. 20.
† Greene in Pittonia, vol. i. p. 168.
‡ Botanical Magazine, t. 4596.
§ For an excellent series of drawings in which the salient features of a stigma of this type are well shown, see Gardeners' Chronicle, 1905, vol. xxxvii. fig. 121 on p. 291.

placed in *Cathcartia* by Maximowicz as *C. integrifolia.** A decade later another of the three was tentatively referred to *Cathcartia* by the same author.† But in these two species the dehiscence of the capsule is confined to apical chinks and does not take place, as in *C. villosa*, by the separation of the valves from the placental ribs throughout their length. This circumstance induced Franchet in 1886‡ to refer *M. integrifolia* to *Meconopsis* rather than to *Cathcartia*, and in this action Franchet was followed as regards both plants by Maximowicz in 1889.§ This subordination of the character derived from the stigma to that afforded by the valvular dehiscence induced Franchet in 1886‖ to refer two species with stigmas of the original *Meconopsis* type to the genus *Cathcartia*. The expectation that in these species, *M. Delavayi* and *M. lancifolia*, the valves of the ripe capsules might be fissile throughout was not fully realised, and in 1895 Franchet transferred both from *Cathcartia* to *Meconopsis*.¶ But Maximowicz and Franchet are not the only authors whose judgment has been influenced by the original decision that the crucial diagnostic character in the case of these two genera is to be found in the degree of separation which takes place in respect of the valves of the capsule. The segregation of the genera by Bentham and Hooker in 1862** again depends mainly on this character, and in 1876, when Maximowicz was describing *Cathcartia integrifolia*, Regel placed in *Meconopsis* another species in which the stigma is like that of *Cathcartia villosa*.†† Since 1886 the experience of others has been the same; in 1889 the dehiscence character was relied on by Prantl and Kundig ‡‡, and in 1895 the same character induced Cummins and the writer to repeat what had been done by Franchet in 1886 as regards a species with a distinct style and a clavate stigma.§§ In this last case, however, the action was not based on the expectation, but was taken with the knowledge that in the species concerned the ripe capsules have valves which may separate from the placental ribs throughout their length. This particular plant, *C. lyrata*, in Dr. Fedde's opinion, may equally well be regarded as a *Meconopsis*.‖‖ The experience of the past twelve months has gone far to justify the soundness of this view.

The fruits of *M. Forrestii*, a species of the group *Primulinae* described in 1907, have now been communicated; so have those of *M. Delavayi*. In both cases they prove to be long and cylindric like those of the species which Fedde has renamed *M. lyrata*. They are larger than the capsules of *M. lyrata*, and those of *M.*

---

* Bull. Acad. Pétersb. vol. xxiii. p. 310.

† Flora Tangutica, t. 23, on which the name *Cathcartia punica* is inscribed.

‡ Bull. Soc. Bot. Fr. vol. xxxiii. p. 389.

§ Flora Tangutica, text at pp. 34, 35.

‖ Bull. Soc. Bot. Fr. vol. xxxviii. pp. 390, 391.

¶ Journal of the Asiatic Society of Bengal, vol. lxiv. part 2, p. 311.

** Genera Plantarum, vol. i. pp. 50, 52.

†† Gartenflora, vol. xxv. p. 291, t. 880 where, however, the figure given is inexact, in that it shows the stigma as subtended by a style.

‡‡ Die Naturlichen Pflanzenfamilien, vol. iii. part 2, p. 141.

§§ Journal of the Asiatic Society of Bengal, vol. lxiv. part 2, p. 325.

‖‖ Das Pflanzenreich, 40 Heft [IV. 104], p. 216.

Forrestii have hardly any style. But size is not an important feature, while the difference as regards style, as the cases of *M. integrifolia* and *M. pseudointegrifolia*, and again, of *M. chelidonifolia* and *M. Oliveriana* have shown us, need not be of more than specific importance.* Moreover, two new members of the group *Bellae* have been reported in which the capsules are again long and cylindric, but have well-developed styles like that of *M. lyrata*. Among the species of *Meconopsis* with long cylindric capsules, we find in *M. Oliveriana* a case in which the fruit opens by the short apical valves of a typical *Meconopsis* or a true *Papaver*. But in *M. Forrestii*, *M. Delavayi*, *M. venusta*, and *M. concinna*, the extent to which the valves separate is considerably greater, and these four forms thus supply conditions intermediate between those that occur in *M. Oliveriana* and in *M. lyrata*. The dehiscence character, therefore, turns out to be a relative, not an absolute one; while it may still prove of value for specific discrimination, it no longer remains effective as a distinction between allied genera.

When the dehiscence character was believed to be of generic significance—and until direct evidence that it had broken down was available there was no good reason for questioning this belief—the treatment accorded to the genera *Meconopsis* and *Cathcartia* in the *Pflanzenreich* was inevitable. Now that the inadequacy of this character is manifest the general position must be reviewed. and the first consequence of the altered situation must be the transfer of the section *Cumminsia* from *Cathcartia* to *Meconopsis*. This transfer effected, we have next to consider whether the section *Eucathcartia* should also be transferred to *Meconopsis*. In arriving at a conclusion, it is necessary to estimate the value of the character afforded by the *Cathcartia* stigma.

We have seen that this character was accorded generic significance by Maximowicz in 1876, and the fact that after 1886 Maximowicz waived his opinion in deference to the judgment of Franchet, does not necessarily prove that the view held in 1876 was erroneous. Franchet's judgment of 1886 was induced by the fact that when ripe fruits of *Cathcartia integrifolia* became known they were found to open only by apical valves. It was therefore based upon the earlier judgment of Hooker which, in 1886, there was no reason to doubt. Now that it is known that the dehiscence character is, at best, of no greater value than the stigmatic character, it is permissible to enquire whether the latter criterion can be adopted in substitution of the former. The recognition of a genus *Cathcartia*, enlarged as Maximowicz, in effect, suggested in 1876 that it should be, would involve the transfer to the original *Cathcartia* of the group *Grandes*, in which the stigma agrees with that of *Cathcartia*, as a compensation for the removal of the section *Cumminsia*, which agrees with *Cathcartia* as regards dehiscence. This, however, we know now to be im-

* In the case of *M. integrifolia* and *M. pseudointegrifolia*, an interesting and prolonged discussion which took place in the *Gardeners' Chronicle* in 1905–6, and was revived in 1911, has testified to a disposition in some quarters to doubt whether the presence or absence of a style be even of specific consequence.

possible. Since 1876 two species unknown to Maximowicz, which constitute the group *Chelidonifoliae*, have been reported from China. The peculiarity of these two species is that as regards root, stem, leaves, and all parts of the flower save the pistil, the two plants are not merely similar, but identical. Yet the pistil of one is globose and has a style with a clavate stigma like that of *M. cambrica*, while the other has a long cylindric pistil with no style, but has a depressed sessile stigma like that of *Cathcartia villosa*. The stigmatic character in this group therefore possesses no greater value than the dehiscence character in some of the other groups.

The objection to the use of either the dehiscence character or the stigmatic one singly does not preclude the simultaneous use of the two. There is no species of *Meconopsis* with a stigma like that of *Cathcartia villosa*, in which the valves of the capsule become separated from the placental ribs beyond the point at which these ribs began to converge to the base of the style. It is, therefore, still easy to keep up the genus *Cathcartia* for the original type *C. villosa*. One practical advantage which attends the adoption of this course, rather than the acceptance of the suggestion made in the *Pflanzenreich*, is that it leaves unchanged a name which is familiar in European gardens. But the knowledge gained from a study of the material communicated since 1909 makes it necessary to modify somewhat the statement of the characters of the genus *Meconopsis*.

MECONOPSIS, *Vig.* *Sepals* 2. *Petals* 4, or 5–9. *Stamens* usually ∞, several-seriate, rarely under 20 and few-seriate. *Stigma* usually 4–6-lobed, rarely 2–3-lobed, terminal on a distinct or occasionally obsolete style, usually capitate or clavate with decurrent almost or quite contiguous rays, less often depressed with stellately divaricate rays on the upper margins of compressed laminae. *Capsule* usually ovoid or oblong opening by the separation of the apices of the valves from the converging upper portions of the placental ribs, less often narrow-cylindric and then sometimes with the valves separating in part or entirely from the lateral parallel portions of the placental ribs.—Herbs *with simple or racemiform cymose scapes, or with simple or branching leafy stems, usually monocarpic and biennial, very rarely annual, occasionally polycarpic or perennial.* Leaves *usually entire or sub-entire, less often lobed or dissected, glabrous or beset with simple or barbellate hairs or setae or prickles.*

In addition to the three species—two East Himalayan and one Western Chinese—of the section *Cumminsia* now transferred from *Cathcartia* to *Meconopsis*, a further increase of thirteen species—one North-Western Himalayan, three East Himalayan, and nine Western Chinese—has taken place since 1906. Two of these species were described in 1907; the remaining eleven are described below.

The accession of these thirteen new species does not affect the sub-division of the genus into the two sections proposed in 1906, viz., *Eumeconopsis*, in which the plants, if not wholly glabrous, are beset with simple hairs, setae or prickles; and *Polychaetia*, the

members of which are more or less hirsute with barbellate hairs or setae. Within each of the sections it is still desirable to recognise a number of groups of closely allied species. In *Eumeconopsis* these groups are:—1, *Anomalae*, which stand alone in the genus in having distinctly ocellate and slightly zygomorphic flowers, and in being annual plants; 2, *Cambricae*, perennial with glabrous leaves, yellow or orange flowers and branching stems; 3, *Cumminsia*, perennials with hirsute leaves and blue or purple flowers; 4, *Decorae*, a new group, with aculeate basal leaves, but only hirsute stem-leaves, and with the lowest flowers on the stem in cymules; 5, *Aculeatae*, with all the flowers on simple pedicels or peduncles and with all parts beset with pungent prickles; 6, *Primulinae*, with usually entire or sub-entire glabrous, hirsute or setose leaves, and flowers in racemose cymes or on simple scapes, but when on simple scapes with 7–8 petals; 7, *Bellae*, with dissected, lobulate or very rarely entire leaves and with flowers always on simple scapes and always 4-petalous or casually 5-petalous. In all the members of the section *Eumeconopsis* the stigma is capitate or clavate with decurrent subcontiguous rays. In the section *Polychaetia* there are but four groups:—8, *Grandes*, with scapose stems or with solitary flowers on simple scapes and with a depressed stigma with stellately divaricate rays; 9, *Torquatae*, with scapose stems and a well-developed disk on the top of the capsule at the base of the style; 10, *Robustae*, with a tall, usually branching stem central to a crown of leaves which precedes its evolution; this crown does not die away during the winter; and 11, *Chelidonifoliae*, with slender branching stems, lobed leaves and perennial rootstocks.

These groups proposed in 1906 as aggregates of nearly allied forms, with the object of facilitating the recognition by the field-botanist and the cultivator of plants with which they might have occasion to deal, have been advanced in the *Pflanzenreich* to the rank of sections, while the sections of 1906 have in turn been treated as sub-genera. When treated as sections, the groups are open to the criticism that the line of demarcation between them does not always appear to be a natural one. In the *Pflanzenreich* exception is taken more especially to the segregation of the *Aculeatae* from the *Primulinae*. If this criticism be just it applies with even greater force to the segregation of the *Primulinae* from the *Bellae*. It has, however, to be borne in mind that, as originally proposed, the groups represent aggregates, not segregates, and as there is reason to believe that they have to some extent served the purpose for which they were intended, their use is continued here as aggregates, not as sections.

The experience of the past twenty years indicates that, in twenty-two per cent. of the species, the petals are yellow with variation in shade on the one hand to ivory-white and on the other to orange; or, in seventy-eight per cent. of the species, are blue, with variation in shade on the one hand to indigo or violet and on the other to purple or red. In the yellow-flowered series the range of variation is, as a rule, slight within the limits of individual species; in the blue-flowered series the range of variation within specific limits is often considerable, and it is noticeable

that the tendency to vary is at times less marked in species near the extreme limits of this range, such as the violet *M. Henrici*, the indigo *M. horridula*, the purple *M. quintuplinervia*, and the red *M. punicea*, than it is among species like *M. aculeata*, *M. rudis*, *M. Prattii*, *M. Wallichii*, where the normal colour is pale blue. But with all this variation there is no instance, so far as is at present known, of a species in which the petals are sometimes yellow, at others blue or purple or red.

In 1896 it was pointed out that in *M. primulina* the stigma, which is of the type with decurrent rays, is 2-partite, the lobes being oblong and plano-convex, the outer convex surface being 2-rayed. It was further pointed out that in this species there is a rudimentary disk composed of four papillae in two pairs, each pair opposite to the stigmatic cleft. It is now known that this solution of the stigma is not peculiar to *M. primulina*. It is sometimes, though not always, met with in the flowers of *M. discigera*, where again there is a disk. In this case, however, the solution may be complete, the individual stigmatic rays or loops being quite discrete and stellately patent; as before, the disk-lobes are alternate with the stigmatic rays or loops. There is, however, no necessary connection between this tendency to solution of the stigmatic rays and the presence of a disk or a rudiment of that structure. A tendency to solution has been met with in *M. psilonomma* from Kansu; and in a specimen of *M. speciosa*, collected by Forrest in 1914 in Yunnan (*Forrest* n. 13240), the stigmatic rays in some of the flowers are as completely separated as in the case of *M. discigera*, though, owing to the fact that the stigma in *M. speciosa* is considerably shorter than it is in *M. discigera*, the appearance which the discrete rays present is less striking.

In 1906 it was necessary to explain that of the alpine vegetation of the Himalayan region and of the Tibetan districts to the north, between 89° and 99° E, practically nothing was then known.* One of the sequels to the Abor Expedition of 1911-12† was the organisation of a systematic survey of the Abor country proper and of the region to the north of the country inhabited by the Abor tribes. This survey included in its scope the exploration of the catchment area of the Dibong, an affluent of the Brahmaputra,‡ and while this was in progress two of the officers employed, Captain Morshead and Captain Bailey, were detached from the main party, and, travelling with very light equipment, were able to traverse the ranges in the district of Chimdro which separate the valley of the Dibong from that of the Dihong, the large river, which debouches next to the west from the Himalaya into the Assam plain. It seems probable that it was in the course of this journey that seeds of a *Meconopsis* "from the Abor country," raised in Greenwich Park in 1914, were obtained. From one of these plants, which flowered in June, came the material upon which the description provided below of the striking species *M. decora* has been based. Subsequently the

* Annals of Botany, vol. xx. p. 330.
† Kew Bulletin, 1912, p. 159.
‡ Geographical Journal, vol. lxii. p. 491.

same two officers were deputed to investigate the course of the Dihong and to verify its identity with the river known in Tibet as the Tsang-po.* In the course of this journey Captain Bailey was able to secure a few fragmentary botanical specimens and some ripe seeds. The specimens include four species of *Meconopsis*, all of them distinct from the one raised in 1914 in Greenwich Park. Two of the four were collected in July, 1913, in the upper Rong-chu Valley, in the extreme east of the province of Kongbo in South-Eastern Tibet, between the 94° and 95° meridians. The other two were obtained in September, 1913, near the 92° meridian, in the district of Tawang, in the Tibetan province of Monyul. The district in which these September specimens were collected, though politically Tibetan, belongs geographically to the Himalayan region, and bears to the country inhabited by the Akha tribes approximately the relationship which Chimdro bears to that in which the Abors dwell. All four differ from every species of *Meconopsis* hitherto recognised by certain well-marked characters, but, having regard to the meagre and incomplete nature of the material available, it has been thought preferable for the moment to exclude two of them from our key to the species and to refer to them, as varieties, under the two fully-known species to which they seem respectively most nearly allied. The remaining two, despite the imperfect nature of the specimens, exhibit, however, features so distinctive that there is no room for doubt as to their claim to specific rank or for uncertainty as to their position in the genus. So far only one species of *Meconopsis* raised from seed obtained by Capt. Bailey during this journey has flowered. The seed was gathered on Pen-la, 17,000 ft.; the plants raised prove to belong to the Nepalese and Sikkim species, *M. simplicifolia*.

KEY TO THE KNOWN SPECIES OF MECONOPSIS.

Leaves glabrous or with simple hairs, setae, or prickles; stigma clavate, its rays decurrent and close-set [p. 141]:—
†Stem-leaves as large as or larger than the radical leaves; petals 4 [p. 138]:—
Flowers somewhat zygomorphic, brick-red with a deep purple eye; annuals:—
Stem-leaves shorter than the internodes; capsule narrow, 4–5-valved ... ... 1. *heterophylla*.
Stem-leaves longer than the internodes; capsule broader, 6-10-valved ... ... 2. *crassifolia*.
Flowers actinomorphic; perennials:—
Flowers yellow or orange; leaves pinnatifid, glabrous or nearly so 3. *cambrica*.

* Geographical Journal, vol. xliv. pp. 341–360, with map.

Flowers blue or purple; leaves hirsute:—
Leaves hastate entire, or lyrate-pinnatifid ... ... 4. *lyrata*.
Leaves ovate-lanceolate, more or less incised-crenate:—
Petals ovate-lanceolate, acute; stamens 16 ... ... 6. *polygonoides*.
Petals rounded, obtuse; stamens 64 ... ... 6. *betonicifolia*.
† Stem-leaves, if any, smaller than the radical leaves; monocarpic, usually biennials [p. 137]:—
Flowers white, the lowermost in 2-flowered cymules; radical leaves prickly, cauline unarmed ... 7. *decora*.
Flowers blue or purple or violet, in raceme-like cymes or on simple scapes, never paniculate:—
‡ Plants armed throughout with pungent prickles [p. 139]:—
Scapes stem-like, leafy below; flowers, except the uppermost, subtended by leafy bracts:—
Petals 4; stigma capitate:—
Capsule fusiform:—
Leaves pinnatipartite to pinnatisect; stigma pale green ... ... 8. *aculeata*.
Leaves incised-crenate or incised-serrate; stigma purple or orange ... 9. *latifolia*.
Capsule long-obconic; leaves sinuately lobed ... ... 10. *sinuata*.
Petals 6–8; stigma clavate:—
Leaves pinnately partite; bracts under the pedicels few and small ... ... 11. *speciosa*.
Leaves subentire or sparingly toothed:—
Prickles pale; pedicels usually short; anthers white or pale buff-coloured ... ... 12. *Prattii*.
Prickles usually purple at base or throughout; pedicels long; anthers orange ... ... 13. *rudis*.
Scapes simple radical or accompanied or replaced by pseudo-stems of agglutinated scapes, leafless or with 1–3 upraised

leaves or bracts under the lowest flowers; anthers yellow 14. *horridula.*

‡ Plants glabrous or hirsute or setose not prickly [p. 138]:—

Scapes with several ebracteate flowers in a raceme-like cyme; leaves entire or subentire; monocarpic, biennials:—

Style almost obsolete; capsule narrow-cylindric; leaves linear-oblanceolate ... 15. *Forrestii.*

Style well developed:—

Petals 4, or casually 5; bluish-purple; anthers dull yellow; capsule narrow; leaves linear-oblanceolate (in this species the central compound scape is sometimes accompanied by radical simple scapes) ... ... 16. *lancifolia.*

Petals 7–8:—

Petals deep blue; anthers pale buff or grey:—

Leaves ovate-lanceolate; capsule narrow ... 17. *lepida.*

Leaves linear-oblanceolate; capsule ovate 18. *eximia.*

Petals violet-purple; anthers bright yellow; leaves linear-oblanceolate; capsule subpyriform (in this species the scapes are usually simple) ... ... 19. *Henrici.*

Scapes simple, each with a solitary flower:—

§ Petals 7–8; leaves linear-oblanceolate; monocarpic, biennials [p. 140]:—

Petals blue or purple; leaves entire or subentire:—

Petals violet-purple; anthers bright yellow; scapes several (see above) ... ... 19. *Henrici.*

Petals deep blue; anthers grey or pale buff:—

Scapes several ... ... 20. *primulina.*

Scape always central, solitary, tall, stout.. 21. *psilonomma.*

Petals white; leaves subruncinate; anthers yellow 22. *argemonantha.*

§ Petals 4, or casually 5; blue or purple [p. 139]:—
Scapes several to many from each crown:—
Ovary densely setose ... 23. *Baileyi*.
Ovary sparingly setose or glabrous:—
Capsule much widened under the base of the style; rootstock long, simple:—
Leaves shortly dobulate, ovate-lanceolate; capsule long-obconic; petals deep blue; monocarpic, biennial 24. *impedita*.
Leaves twice pinnatisect; capsule ovate; petals light blue; polycarpic.. 25. *bella*.
Capsule narrow-cylindric:—
Leaves runcinate, lobes 3-7-jugate, ovate or lanceolate, or the outermost, rarely all the leaves entire, obovate-lanceolate; rootstock short, tuberous, several-lobed: anthers grey: ?monocarpic, biennial ... 26. *concinna*.
Leaves once pinnatisect, lobes 1-2-jugate, orbicular or wide-oblong, or the outermost, rarely all the leaves entire, spathulate-oblong; rootstock long, simple; anthers orange; polycarpic ... ... 27. *venusta*.
Scapes solitary or sub-solitary from each crown; leaves all entire or subentire, spathulate-oblong; rootstock long, simple; polycarpic ... ... 28. *Delavayi*.

*Leaves more or less hirsute with barbellate hairs [p. 137]:—
Stems simple and scapose, or 0; leaves mostly or all radical, subentire:—
Capsule without a disk; stigma depressed, its rays stellate-divaricate:—
Flowers yellow, petals 5-8; monocarpic, biennials:—
Style 0 ... ... 29. *integrifolia.*
Style distinct ... ... 30. *pseudointegrifolia.*

Flowers blue or purple or scarlet:—
Style distinct; petals 5-8:—
Stem scapose; flowers blue or purple; polycarpic ... ... 31. *grandis.*
Stem 0; flowers blue; monocarpic, biennial ... ... 32. *simplicifolia.*
Style 0; petals 4:—
Flowers purple; polycarpic ... 33. *quintuplinervia.*
Flowers scarlet; monocarpic, biennial ... ... 34. *punicea.*
Capsule with a flat disk round base of style; stigma clavate, its rays decurrent and close-set; petals 4; polycarpic:—
Petals pale pink; lobes of disk entire; style very short ... ... 35. *torquata.*
Petals yellow; lobes of disk incised; style long ... ... 36. *discigera.*
Stems branched; radical leaves lobed or pinnatifid; stem-leaves numerous:—
Stems robust; flowers usually in panicles of cymules; monocarpic, biennials:—
Capsule ovate, 8-11-valved:—
Flowers white; stem-leaves incised-toothed ... ... 37. *superba.*
Flowers yellow:—
Stem-leaves incised-toothed ... 38. *paniculata.*
Stem-leaves pinnatifid ... ... 39. *robusta.*
Capsule oblong, 5-7-valved; stem-leaves pinnatifid:—
Leaves setose but not persistently puberulous ... ... 40. *napaulensis.*
Leaves both setose and puberulous ... ... 41. *Wallichii.*
Stems slender; flowers small, yellow, cymose; perennials:—
Capsule ovate; style distinct: stigma clavate, its rays decurrent and close-set ... ... 42. *chelidonifolia.*

Capsule narrow-cylindric; style obsolete; stigma depressed, its rays stellate-divaricate ... 43. *Oliveriana*.

§ **EUMECONOPSIS**, Prain in Ann. Bot. vol. xx. p. 343 (sect.); Fedde in Pflanzenr. IV. 104, p. 248 (subgen.).

1. ANOMALAE, Prain, l.c., p. 344; Fedde, l.c., p. 253 (sect.).

1. **Meconopsis heterophylla,** Benth.: Irving in Gard. Chron. 1906, vol. xl. p. 23; Fedde, l.c., fig. 33 F–H (1909); Mottet in Rev. Hort. 1912, p. 203; Gard. Chron. 1914, vol. lv. p. 18, fig. 10.

A writer in the *Gardeners' Chronicle* for 1914 terms *M. heterophylla* the only American species of *Meconopsis*, thus repeating a statement made in the same journal on July 14, 1906. The actual state of affairs was explained in the *Annals of Botany* in October, 1906. The statement repeated in 1914 may be correct, but from the evidence available, all that can yet be said is that *M. heterophylla* is the only American *Meconopsis* to be met with in European gardens.

2. **Meconopsis crassifolia,** Benth.: Fedde, l.c., p. 255, fig. 33 J, K (1909).

In addition to being not merely monocarpic but annual plants, the members of the *Anomalae* group differ from those of the other groups in having slightly zygomorphic flowers. For this reason it seems desirable to take them out of the position in the sequence of groups suggested in 1906.

2. CAMBRICAE, Prain, l.c., p. 343; Fedde, l.c., p. 251 (sect.).

3. **Meconopsis cambrica,** Vig.: Fedde, l.c., fig. 34 A, B (1909); Mottet in Rev. Hort. 1912, p. 203; Fitzherb. in Gard. Chron. 1913, vol. liv. p. 52, fig. 26.

3. CUMMINSIA, Prain, l.c., p. 368 (sect. sub *Cathcartiam*); Fedde, l.c., p. 245. Inermes; perennantes; caules elongati, foliosi, simplices vel ramosi; folia inciso-crenata vel lyrato-pinnatifida, sparse hirsuta; sepala fere glabra; flores purpurei vel coerulei petalis 4; styli distincti; capsula glabra, sensim in stylum attenuata.

4. **Meconopsis lyrata,** Fedde, l.c., p. 246 (1909).—*Cathcartia lyrata*, Prain, l.c., p. 369; Fedde, l.c., p. 246, fig. 33 E; Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 172 (1911): Smith, l.c., p. 348 (1913).

Additional material of this species, in flower, was communicated in 1913 to the Royal Botanic Garden, Edinburgh, from Sikkim; Phedup, 13,000 ft., *Romoo* 1120. It has further been collected at Nachegoh, 15,000 ft.; also at Karponang, Sherabathang and in the Dichu Valley, 9000-13,000 ft., *Smith* 3168, 3758, 4308. Plants have not yet, however, been raised in European gardens.

5. **Meconopsis polygonoides,** Prain.—*Cathcartia polygonoides*, Prain l.c.; Fedde, l.c., p. 246, fig. 33 L.

6. **Meconopsis betonicifolia,** Franch. Pl. Delavay., p. 42. t. 12 (1889).—*Cathcartia betonicifolia*, Prain, l.c.; Fedde, l.c., p. 245, fig. 33 D.

The necessity for the transfer of this group of species from *Cathcartia* to *Meconopsis* has already been explained. It stands next to the *Cambricae* with which it agrees in having slender stems with petioled stem-leaves, and in having perennial root-stocks; it differs in having sparingly hairy leaves, blue or purple flowers, and long, slender, ripe capsules, in which, in the only species where the ripe fruit is known, the dehiscence is not confined to the apex of the valves.

4. Decorae, Prain. Armatae quoad folia radicalia, ceterum inermes; caulis evolutus simplex; folia radicalia pinnatifida, caulina inciso-serrata; sepala setosa; flores albi petalis 4–6; styli distincti; capsula dense setosa, sensim in stylum attenuata.

7. **Meconopsis decora**, Prain; species ob folia radicalia *Aculeatas*, ob flores saltem inferiores cymulosim dispositos *Robustas* in memoriam reducens; ab his tamen pilis simplicibus ab illis stylo elongato gracili ovarioque haud aculeato longe recedens.

Herba plus minusve hirsuta. *Caulis* evolutus. *Folia* radicalia pauca, ambitu ovato-oblonga, acuta, basi late cuneata, pinnatipartita segmentis falcato-oblongis iterum e latere convexo lobulatis, longe petiolata, utrinque aculeis pungentibus armata, 5 cm. longa, 2·5 cm. lata; petiolus 4 cm. longus, aculeis patentibus armatus. *Folia* caulina anguste oblonga vel oblongo-lanceolata, acuta, basi truncata, margine inciso-serrata, sessilia, utrinque setis vel pilis flexuosis induta, 3·5–6 cm. longa, 1·5–2 cm. lata, cymulas 2-floras vel versus apicem caulis flores singulos subtendentia. *Flores* pedicellati pedicellis gracilibus subflexuosis 4–6 cm. longis setis subpatentibus vestitis; cymulae utriusque junior ex axilla bracteae ovato-oblongae acutae margine lobulatae 1·5 cm. longae 1 cm. latae ortus. *Sepala* 2, ovata, extra retrorso-setosa. *Petala* 4–6, oblonga, alba, glabra. *Stamina* ∞, pluri-seriata, filamentis albis discretis glabris; antherae aureae. *Ovarium* e carpellis 4–6 compositum, subglobosum, setis albis simplicibus dense indutum; stylus gracilis elongatus; stigma breve clavatum lobis decurrentibus contiguis purpurascentibus; placentae intrusae; ovula plurima. *Capsula* adhuc ignota.

Eastern Himalaya: Chimdro; mountains between the Dibong and Dihong Rivers, *Bailey*.

The account here given of this interesting species has been based on material communicated to Kew on 8 June, 1914, from a living plant in the collection at Greenwich Park, where it had been raised by Mr. T. Hay from seed collected by Captain F. M. Bailey. This seed is said to have come from the Abor Country, and Mr. Hay on raising plants had supposed them to belong to *M. aculeata*; when flowers appeared he took the form to

be a white-flowered variety of that species. It is, however, in reality so distinct that it is advisable to treat it as the type of a separate group.

5. Aculeatae, Prain, l.c., p. 346; Fedde, l.c., p. 255 (sect.).

8. **Meconopsis aculeata,** Royle: Fedde, l.c., fig. 35 N (1909); Mottet in Rev. Hort. 1912, p. 203.

var. **typica**; caules erecti simplices, raro basi 2 3 adscendentes, 30–60 cm. alti; rhizoma simplex crassum dauciforme, radicibus gracilibus perpaucis ornatum.

North-west Himalaya: In every district from Hazára to Kamaon.

var. **nana**, Prain; caules erecti simplices, 10–15 cm. alti; rhizoma gracile radices graciles dense caespitosas emittens.

North-west Himalaya: Chamba, 9000 ft., *Beresford*.

This species is the familiar 'Prickly Blue Poppy of Kashmir' of our gardens, and it is unusual to find plants with petals other than sky-blue. Yet in neither of the coloured figures of the species which have been published so far is the usual colour shown; that by Royle (Ill. Bot. Him. t. 15) has red petals; that by Hooker (Bot. Mag. t. 5456) has purple flowers. In connection with the latter illustration, Sir William Hooker has suggested that the colour in Royle's figure may be erroneous, and may be due to the figure having been made from a herbarium specimen. That this is not necessarily the explanation has been now ascertained. In May, 1908, a plant of *M. aculeata* with flowers of the same colour and very nearly the same shade as those of Royle's picture blossomed in the collection at Kew. This red colour is, however, evidently rare as compared with the purple of Hooker's figure, while the latter is itself uncommon; of all the species with normally sky-blue petals *M. aculeata* and its ally *M. latifolia* are the two which in cultivated plants show the least tendency to vary. It has been noted that whatever the colour of the petals may be the filaments in *M. aculeata* are the same, though, as in the other normally sky-blue species, the shade may be rather deeper. It has also been noted that whatever the colour of the petals and filaments may be, the stigma in *M. aculeata* is always pale green.

The figure of *M. Gulielmi-Waldemari*, given by Klotzsch (Bot. Ergebn. Waldem. Reise, t. 36) shows a plant with several slender ascending stems in place of the solitary stem characteristic of *M. aculeata*. This condition, for it is no more, of *M. aculeata* seems to be unusual. It has not been met with in cultivated plants, and no one appears to have noticed it in the field since Hofmeister collected the specimen figured by Klotzsch. Among the many earlier gatherings of *M. aculeata* examined, only one example of this condition with several stems has been seen. This specimen was collected by Strachey and Winterbottom, at Niti, in Garhwal, at 11,000 ft., along with the ordinary condition. The appearance of that specimen suggests the possibility of some injury to the crown prior to the commencement of the flowering season's growth.

The examination of a large series of specimens makes it possible to separate off two recognisable forms within typical *M. aculeata*. These may be termed:—*a normalis*, with obtuse or rounded subacute leaf-segments and almost always short pedicels, under 2 in. long; and *β acutiloba*, with the leaf-segments triangular in place of ovate, and almost always long pedicels, 4–8 in. long, with in this case also at times a number of simple radical scapes accompanying the central stem. The two characters, shape of leaf-segment and length of pedicel, do not, however, run absolutely concurrently; that afforded by the pedicels will be remarked upon later in another connection. The form *β acutiloba* is comparatively rare.

Professor Balfour has observed that in the Edinburgh Alpine Garden *M. aculeata* develops simple radical scapes in addition to a central stem more readily in early shooting individuals than in late, a circumstance which has suggested a possible temperature check of the terminal scape. This suggestion is supported by the fact that destruction of the terminal scape in the course of the flowering season's growth always results in the production of profuse basal laterals.

The form indicated above as var. *nana*, which is also apparently rare, is on a different footing. It can be readily distinguished from any form or condition of typical *M. aculeata*, not only on account of its small size, but by having a slender rootstock which breaks up into a tufted mass of fibrous roots, which replace the stout vertically descending carrot-like stock characteristic of the type. The earliest record of this dwarf variety is afforded by a specimen at Kew which flowered at Longford Bridge in July, 1865; beyond the fact that it reached Longford Bridge from the Liverpool Botanic Garden nothing is known of the history of this particular plant, which has hitherto been accepted as a stunted example of typical *M. aculeata*. Recently, however, more light has been thrown upon this form. In 1907 some seeds were sent to Kew by Lieut. G. D. Beresford, 10th Lancers, then stationed at Jullunder in the Panjab, with the note:—"Seeds of small Blue Poppy gathered in Chamba region (Himalaya); flowers light blue; found growing at an elevation of 9000 ft. and upwards in damp shady nallas, frequently in ground that has been covered with snow till fairly late in the year." Biennial like the type, the plants raised from these seeds flowered at Kew late in June, 1909, all the plants of the batch being from 3–5 in. high, and having a tuft of fibrous roots in place of the thick rootstock of typical *M. aculeata*. The reduction in size extends in this variety to the capsule and the seeds: the stigma is pale green, as in *M. aculeata* proper.

Instances of deviation from the normal 4-petalous condition, though not unknown in *M. aculeata*, are rare. In a case noted in June, 1909, there was only one abnormal flower on the plant. In this flower there were eight petals, four normally disposed, and other four considerably smaller, constituting an inner whorl again disposed in two pairs exactly like the outer four. Their nature was suggested by the circumstance that there was one

perfect stamen, which arose from the receptacle outside the point of origin of one of the petals forming the outer pair of the inner series.

Hitherto, in passages dealing with this species, Kashmir has been given as its westmost limit of distribution. It is now known that it extends further west into Hazára, where it has been gathered at Makra, Kagán, at 13,000 ft., by collectors employed by the Saharanpur Botanic Garden. It has not, however, been met with west of the Indus Valley, and it has now to be remarked that it does not extend to the north of the mountains of Kashmir proper. It would appear from the *Pflanzenreich* that there is in the herbarium at Berlin a specimen of *M. aculeata* distributed from Kew in 1864 as No. 117 Herb. Falconer, which was collected in Garhwal. No specimen of *M. aculeata* brought to Saharanpur from Garhwal by Dr. Falconer's native collectors has been retained in the herbarium at Kew; all the specimens there included under the Kew distribution number 117 were collected either on the mountains that surround the valley of Kashmir or in the passes to the north of and outside Kashmir proper. They represent the following original field numbers in Herb. Falconer:—1384; 1418/2; 3015/2; 3039; 3191/2. All the Kashmir specimens in question belong to typical *M. aculeata*, Royle; none of those from the passes to the north of Kashmir belong to *M. aculeata*. The form to which the latter belong is one that until 1908 had been consistently included in Royle's species, to which it is indeed closely allied but from which it is better kept distinct.

9. **Meconopsis latifolia,** Prain; species *M. sinuatae*, Prain, et *M. aculeatae*, Royle, quam maxime accedens; ab hac foliis haud pinnatisectis stigmatisque colore ab illa foliis margine incisis nec sinuatis capsulaque breviore facillime distinguenda.

Herba armata. *Caulis* evolutus, simplex, 1–1·25 cm. altus. *Folia* radicalia ambitu ovato-oblonga vel oblonga, apice obtusa, basi cuneata, margine grosse inciso-crenata vel inciso-serrata, longe petiolata, supra viridia, subtus glaucescentia, utrinque aculeis pungentibus obsita, 15–18 cm. longa, 4–5 cm. lata; petiolus 5–6 cm. longus. *Folia* caulina basalibus similia sed gradatim minora, 8–15 cm. longa, 3–4 cm. lata, petiolis gradatim brevioribus summis bracteis proximis subobsoletis. *Flores* in cymas racemiformes dispositi; pedicelli 2–6 cm. longi, aculeati, bracteati; bracteae foliis conformes nisi minores, sessiles. *Sepala* 2, ovata, extra parcius aculeata. *Petala* 4, ovato-rotundata, saepe subcuspidata, 3 cm. longa, 2·75 cm. lata, clare coerulea. *Stamina* ∞, pluri-seriata, filamentis intense coeruleis discretis glabris; antherae aureae. *Ovarium* e carpellis 4 compositum, ovoideum, aculeis pungentibus densius indutum; stylus elongatus; stigma capitatum lobis decurrentibus contiguis purpureis vel casu aurantiacis; placentae intrusae; ovula plurima. *Capsula* subfusiformis, 2·5–2·75 cm. longa.—*M. sinuata*, Irving in Gard. Chron. 1908, vol. xliv. p. 202, fig. 88; vix Prain. *M. sinuata*, var. *latifolia*, Prain in Bot. Mag. t. 8223 (1908); Kew Bull. 1909, app. 3. p. 95. *M. aculeata*, Smith in Gard. Chron. 1909, vol. xlvi. p. 91, figs. 38, 39; nec Royle.

Northern Kashmir: Gurais Pass, 12,000 ft., *Winterbottom* 498; Tragbol, 10,500 ft., *Clarke* 29299; passes north of Kashmir, *Falconer* 3139, 3191/2; *Appleton*.

The late Mr. C. B. Clarke, during a journey made by him in 1876 through Kashmir as far as the Karakoram Range,* met with *M. aculeata*, Royle, at Palgam, 13,000 ft., on September 4 (*Clarke* n. 31057), and in the Marbul Pass, 10,500 ft., on September 15 (*Clarke* n. 31291). The plant now described as *M. latifolia* he collected at Tragbol, 10,500 ft., on July 20 (*Clarke* n. 29299). To him belongs the credit of having been the first to note in the field that this plant differs from *M. aculeata*, Royle, as that species has been defined, though he never formally published this view, and his specimens at Kew show that at a later date he acquiesced in its reduction to *M. aculeata*. Clarke, however, was not the first collector of this plant. It had been obtained on two separate occasions, as long ago as 1838, to the north of Kashmir, by native collectors employed by Dr. H. Falconer, then in charge of the Botanic Garden at Saharanpur, and it was collected again, on the Gurais Pass at 12,000 ft., by Mr. J. E. Winterbottom on June 20, 1847 (*Winterbottom* n. 498). Winterbottom's plant was accepted by Hooker and Thomson in 1855 as a form of *M. aculeata*, Royle,† and, like Clarke, the writer was content in 1896 and again in 1906 to accept this identification as correct.

The introduction of *M. latifolia* to cultivation has, however, afforded an opportunity of comparing it with *M. aculeata* in the living state, and has led to the conclusion that Clarke's original view is probably correct. This introduction we owe to Lieut.-Col. Appleton, R.E., who, writing from Lucknow on 7th January, 1906, advised the despatch "of a small bottle (sealed) containing mature seeds of the blue Kashmir poppy, which I do not remember to have noticed in the Kew or Edinburgh Alpine gardens. It grows generally at 10,000 to 13,000 ft. elevation and has the habit of a Saxifrage, that is, it is always found growing in the crevices of rocks or among loose piles of stone debris on stone slides and below cliffs. It likes the full sun, and springs to full growth after the snow melts off, while the ground is still damp."

Knowing how careful an observer Col. Appleton is, and remembering that *M. aculeata* had been in continuous cultivation both at Kew and at Edinburgh for at least half a century, especial attention was paid to this seed. The supply being fortunately ample, in addition to sowing a quantity at Kew, packets were distributed to the Botanical Gardens at Edinburgh, Glasnevin, Oxford and Cambridge, and exchanged with Messrs. J. Veitch and Sons and the Messrs. Bees. The seed was issued from Kew as *M. aculeata*?, but when the plants raised from the seeds sown in 1906 came into flower in 1908, it was pointed out both by Mr. W. Irving at Kew and by the Messrs. Veitch at Coombe Wood that they belonged to a species distinct from *M. aculeata*. The judgment of observers so experienced and

* Kew Bulletin, 1906, p. 273.
† Flora Indica, vol. i. p. 253.

competent was not to be lightly set aside, and their reasons for refusing to treat Col. Appleton's plant as a form of *M. aculeata* were, in fact, incontrovertible. Ripe capsules, however, were not for the moment available, so that when the plant was figured in the Botanical Magazine in 1908 the writer, while removing it from *M. aculeata*, refrained from according it the rank of a species, but treated it instead as a variety of *M. sinuata*, between which and *M. aculeata* it stands, as regards foliage, in an intermediate position.* Now, however, that its ripe capsules are known, it is evident that *M. latifolia* cannot be included in *M. sinuata*, and the only alternative is to accord it the status of a species apart.

10. **Meconopsis sinuata**, Prain: Fedde, l.c., p. 256, fig. 35 o (1909); Smith, Rec. Bot. Surv. India, vol. iv. p. 347 (1913).

This has been collected again in Sikkim, at Changu, 13,000 ft., *Smith* n. 3147, but has not yet found its way into European gardens.

11. **Meconopsis speciosa**, Prain in Trans. Proc. Bot. Soc. Edin., vol. xxiii. p. 258, t. 2 (1907); Forrest in Gard. Chron. 1911, vol. l. p. 51.

This species has been met with a second time in South-western China by Mr. F. K. Ward, whose specimens (*Ward* n. 817) agree exactly with the original specimens communicated by Mr. G. Forrest, who has collected it again on the Mekong-Salwin Divide in Yunnan, in 1914 (*Forrest* n. 13,240). It has not yet flowered in European gardens, nor has it been taken up in the *Pflanzenreich*.

12. **Meconopsis Prattii,** Prain in Bot. Mag. sub t. 8568 [nomen] (1914) et in Bot. Mag. t. 8619 (1915); species e grege *Aculeatarum* proxime *M. sinuatae*, Prain accedens et olim eacum conjuncta, sed foliis subintegris petalis numerosioribus capsulaque oblonga nec longe obconica facillime sejungenda.

Herba armata, monocarpica, biennis. *Rhizoma* anguste dauciforme, elongatum. *Caulis* evolutus, simplex, 3·5–7·5 dm. altus. *Folia* radicalia basaliaque late lanceolata, apice acuta, basi sensim in petiolum attenuata, margine subintegra raro versus basin paucidentata, supra pallide viridia, subtus etiam pallidiora, utrinque aculeis pungentibus obsita, 10–15 cm. longa, 2·5–3 cm. lata; petiolus 6–8 cm. longus. *Folia* caulina basalibus similia sed gradatim minora, 6–14 cm. longa, 2–2·5 cm. lata, petiolis gradatim brevioribus summis bracteis proximis subobsoletis. *Flores* in cymam racemiformem dispositi, interdum etiam pauci in pedunculos simplices circa basin caulis enatos additi; pedicelli saepissime 1–2 cm., nonnunquam 3–4 cm., rarissime 10 cm. longi, aculeati, summis exceptis bracteati; bracteae foliis conformes nisi minores, sessiles. *Sepala* 2, oblongo-ovata, extra aculeata. *Petala* 6–8, oblonga, obtusa, 2·25–2·5 cm. longa, clare coerulea vel pur-

* Even in this respect, however, *M. latifolia* differs equally from both, for in *M. aculeata* and *M. sinuata* the sinuses between the lobes of the leaf are rounded, whereas in *M. latifolia* the sinuses are acute.

pureo suffusa vel raro pallide purpurea. *Stamina* ∞, pluriseriata, filamentis intense coeruleis discretis glabris; antherae albidae vel gilvae. *Ovarium* e carpellis 4 compositum, ovoideum, aculeis pungentibus densius indutum; stylus elongatus; stigma clavatum, lobis decurrentibus contiguis pallide virescentibus; placentae intrusae; ovula plurima. *Capsula* oblonga, 1·25 cm. longa.—*M. sinuata*, var. *Prattii*, Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2, p. 314 (1896). *M. rudis*, Prain in Ann. Bot. vol. xx. p. 347, syn. *M. horridula*, var. *rudis* excl. (1906); Farrer in Gard. Chron. 1914, vol. lvi. p. 318, et 1915, vol. lvii. p. 110. *M. Wardii*, Farrer, l.c. 1915, vol. lvii. p. 110 [nomen]. *M. racemosa*, Fedde, l.c., p. 258, pro parte et quoad fig. 35 M (1909); T. Smith in Gard. Chron. 1909, vol. xlvi. p. 91, fig. 40; Wilson, Western China, vol. i. p. 138 (1913); nec Maxim.

Western China: West Kansu; Sien-wha-shan, 11,000 ft., *Purdom* 736; Peling Range, 13,000 ft. (form with long-pedicelled flowers and with simple basal scapes accompanying the stem), *Purdom*. Western Szechuan; near Ta-chien-lu, 13,000–15,000 ft., *Soulié* 635; *Pratt* 525; *Wilson* 3162; *Ward* 762, 891: Mupine, 14,000 ft., *Wilson* 3030. North-western Yunnan; A-tun-si, 13,000 ft., *Forrest;* Chung-tien Plateau, 12,000–14,000 ft., *Forrest*, 12664, 12834; Mekong-Yangtse Divide, Kari Pass, 13,000 ft., *Forrest*, 13021.

This species, then known only from specimens collected by Pratt, was treated by the writer in 1896 as a variety of *M. sinuata*, which it greatly resembles in habit, but from which it differs in having the leaves subentire and acute. The fuller material available in 1906 showed that it further differs as regards number of petals, 6–8 in place of 4, and as regards shape of capsule, oblong in place of long-obconic. It was therefore removed from *M. sinuata* and treated as an integral portion of *M. rudis*, with which it agrees in number of petals, in length of style, and in shape of capsule, when that species itself was being removed from *M. horridula*, to which it had been referred as a variety in 1896. But on his return from his Chinese journey of 1908, Mr. E. H. Wilson, who, with the kind permission of Professor Sargent of the Arnold Arboretum, had paid particular attention on the writer's behalf to the genus *Meconopsis* in the field, subjected the treatment of 1906 to useful criticism. Mr. Wilson was in a position to show that the removal of *M. rudis* from *M. horridula*, effected in 1906, was essential. He had for the first time been able to collect this species himself on the uplands of Pan-lan-shan, west of Kuan-hsien, at 14,000 ft., in June, 1908, in flower, meeting with it again in the same neighbourhood in August in fruit, and collecting it again both in fruit and in flower, also in August, in the mountains to the north of Mupine, at 12,000–13,000 ft. At the same time, however, he had to point out that *M. sinuata*, var. *Prattii*, as originally defined in 1896, is even more distinct from *M. rudis* than the latter is from *M. horridula*. Mr. Wilson was already well acquainted with *M. sinuata*, var. *Prattii*, which he had collected on cliffs near Ta-chien-lu, at 15,000 ft. in July, 1914 (*Wilson* 3162), and was able to refresh his memory as to its appearance by meeting with

the plant again among rocks in Mupine, at 14,000 ft., in July, 1908 (*Wilson* 3030). In 1913, in his work on Western China, Mr. Wilson, while maintaining the view that *M. Prattii* is distinct from *M. rudis*, has accepted the *Pflanzenreich* arrangement and has referred both the Ta-chien-lu and Mupine *M. Prattii* (vol. i. p. 138), and the form of *M. horridula* collected by him on the higher alps of Western Szechuan (vol. ii. p. 9) to *M. racemosa*, Maxim.

Since 1908 both *M. Prattii* and *M. rudis* have been in cultivation in European gardens; observation of the two in the living state has fully confirmed the justice of Mr. Wilson's criticism. Though nearly allied, the two differ considerably in the consistence of their leaves, those of *M. Prattii* being softer in texture and of a different shade of green; in their prickles, which in *M. Prattii* are weaker and are always pale in colour, those of *M. rudis* usually being purple, at least at the base; in the anthers, which are whitish or buff-coloured in *M. Prattii*, yellow in *M. rudis;* and in the stigma, which in *M. Prattii* is greenish white, but in *M. rudis* is orange. The style, too, in *M. Prattii* is more slender, while the stigma is smaller than in *M. rudis*. Another difference between *M. Prattii* and *M. rudis* has impressed cultivators of these two species. In the former plant all the pedicels except the terminal one which supports the flower that opens first are short or very short, thus imparting a relatively compact appearance to the inflorescence; in the latter all the pedicels are long or very long and the inflorescence is therefore more open and lax. But this difference, though sufficiently striking to deserve notice, is not one on which too great stress should be laid. Within *M. aculeata* we find the same striking difference in appearance, yet in that species no great account has been, or can be, taken of the character. Moreover, there is evidence that the same variability is manifested in *M. Prattii*. The specimens collected by Mr. Purdom at Sien-wha-shan, in West Kansu (*Purdom* 736), are not distinguishable from the original type of *M. Prattii* from near Ta-chien-lu, in West Szechuan. But the plant met with by the same collector on the Peling Range has all the stem pedicels very long, exactly as in the corresponding condition of *M. aculeata*, Royle, and has, moreover, what is rather rare in *M. aculeata*, a considerable number of long, slender, 1-flowered, simple radical scapes surrounding the base of the central stem. In this instance, too, the character would appear to be a fixed one, for in a plant presented to Kew by the late Mr. R. Woodward, junior, who had raised it at Arley Castle from seed of this Peling Range form, the character of long stem-pedicels with accompanying radical simple scapes is as marked as in the original specimen.

13. **Meconopsis rudis**, Prain in Bot. Mag. t. 8568 (1914).—*M. racemosa*, Franch. in Bull. Soc. Bot. Fr., vol. xxxiii. p. 38 (1886) et in Pl. Delavay., p. 41 (1889); nec Maxim. *M. horridula*, var. *rudis*, Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2. p. 314 (1896). *M. rudis*, Prain in Ann. Bot. vol. xx. p. 347, syn. *M. sinuata*, var. *Pratii* excl. (1906); Fedde, l.c., p. 256. syn. *M. sinuata*, var. *Prattii* excl. (1909).

Western China: Yunnan; Likiang Range at Sui-chen, *Delavay;* Mekong-Salwin Divide, 14,000 ft., *Forrest* 13233. Western Szechuan; mountains north of Mupine, 12,000-13,000 ft., *Wilson* 951; Pan-lan-shan, west of Kuan-hsien, 14,000 ft., *Wilson* 951A.

In *M. rudis* we find the same degree of variation in colour of petals, from sky blue to blue suffused with pink or purple and to pale purple, that is occasionally met with in *M. aculeata* and is so common a feature in *M. Prattii*. The relationship which *M. rudis* bears to *M. Prattii* has already been discussed. Its closest affinity, however, is with *M. horridula*, of which it was treated as a variety in 1896. In *M. horridula* the petals are usually of a deep dark blue colour, but even of that species it has been noted in the field that pale blue flowers occur. In both *M. rudis* and *M. horridula* the anthers are deep yellow, and the most outstanding difference between the two lies in the style, which is twice as long in *M. rudis* as it is in *M. horridula*.

In *M. rudis* the stem, which is leafy below but has only a few of the lower stem-pedicels bracteate, is accompanied, in all the wild specimens seen, by a number of simple, 1-flowered, radical scapes.

There is a field note associated with a specimen of *M. lancifolia* (*Forrest* n. 469) communicated by Mr. G. Forrest to the Edinburgh Herbarium, which suggests that he may have seen *M. rudis* on the Mekong-Salwin Divide between Lat. 27° and 27° 30′ N in July or August, 1905; he has, indeed, since then, collected the species there. There is, however, no specimen with that note, and there is some ground for doubt owing to the fact that the plant referred to by Forrest occurs at about 9000 ft. elevation—as low down as *M. aculeata*, var. *nana* comes in the Panjab Himalaya. As we have not, from Western China, specimens of any member of the groups *Aculeatae* and *Primulinae* from so low an elevation as 9000 ft., it is not impossible that we may expect an as yet unknown species of *Meconopsis* from this region.

The same seems to be even more probable with regard to the Eastern Himalaya. During the Tsang-po Expedition of Captain Bailey and Captain Morshead, the first-named officer collected, on 18 September, 1913, at Potrang, 14,200 ft., a locality near the Pö-la, 91° 58′ W, 27° 55′ N, flowers of a *Meconopsis* belonging to the series of species of the *Aculeatae* group in which the flowers are 6–8-petalous. At the same time, this form has the short subcapitate stigma characteristic of the series of species, within the same group, in which the flowers are normally 4-petalous. It further appears to have simple 1-flowered scapes as in the "typical" condition of *M. horridula*. No leaves were collected. Except as regards the stigma, it comes nearest to *M. speciosa* and *M. rudis*, and for the moment it may best be regarded as a variety of the latter species.

var. **intermedia,** Prain; *forma scapis ut videtur more M. horridulae simplicibus floribus nisi stigmate more M. sinuatae et M. aculeatae aeque longo latoque M. rudem et M. speciosam in memoriam reducens.*

Eastern Himalaya: Monyul; Tawang district at Potrang, 14,200 ft., *Bailey* 2.

14. **Meconopsis horridula,** Hook. f. & Thoms.; Fedde, l.c. p. 257, fig. 35 K, L (1909); Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 171 (1911); Smith, l.c., p. 347 (1913).

Var. **typica**; scapi omnes radicales, simplices, 1-flori.

Tibet: Eastern provinces; Kon-chin-la, 14,500–15,000 ft., *Przewalski*. Central provinces; Koko-chili, 35°–37° N, 85°–93° E, *Sven Hedin;* 35° 20′ N, 92° E, 16,000 ft., *Wellby & Malcolm;* Amdo, 32°–33° N, 91° E, *Bower & Thorold* 134; Gooring Valley; 30° 12′ N, 90° 25′ E, 16,500 ft., *Littledale;* without precise locality, *Rockhill*. Southern provinces; Lhassa, 12,000 ft., *Waddell;* Karo-la, 16,500 ft., *Walton;* Khambajong, 15,800–17,500 ft., *Prain;* Gyantse, *Bailey;* Bomtso, *Hooker;* between Phari and Shigatse, *King's collectors*.

Eastern Himalaya: Sikkim; Kongra-lama, 14,000 ft., *Hooker*: Kan-ko-la, 15,000 ft., *Gammie*: Donkia-la, 14,000–15,000 ft., *Gammie, Cummins;* Llonakh, 15,000–16,000 ft., *Smith & Cave* 2015; Chola, Gaoring, 14,000-16,000 ft., *Smith* 3990. Chumbi; Te-ling, *Dungboo*.

Western China: West Szechuan; between Batang and Tachien-lu, 16,000 ft., *Hosie*.

Var. **racemosa**, Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2, p. 313 (1896); Smith in Rec. Bot. Surv. India, vol. iv. p. 347 (1913); scapi nonnulli vel omnes in cymam racemiformem floribus omnibus ebracteis vel 1–2, raro 3, prope basin bracteatis agglutinati.—*M. racemosa*, Maxim.: Bulley in Gard. Chron., 1905, vol. xxxvii. p. 397; Garden, 1905, vol. lxviii. p. 384, cum icon.; Fedde, l.c., p. 258 (1909) pro parte maxima; Mottet in Rev. Hort. 1912, p. 205; Wilson, Western China, vol. ii. p. 9 (1913). *M. horridula* var. *abnormis*, Fedde, l.c. (1909).

Tibet: Central provinces; Amdo, 32°–33° N. 91° E, *Potanin*. Southern provinces; hills above Lhassa, 14,000 ft., *Walton:* Khambajong, 15,800 ft., *Prain;* between Phari and Shigatse, *King's collectors*.

Eastern Himalaya: Sikkim; Kan-ko-la, 14,000 ft., *Hooker;* Tan-kra-la, *Gammie;* Ta-ne-gang, Gia-gong and near Cho-la, *King's collectors;* Lachung, *Dungboo;* Ningbil, 14,000–15,000 ft., *Smith* 4077. Chumbi; Ta-chey-kung, *King's collectors*.

Western China: West Szechuan; between Batang and Tachien-lu, 14,000-16,500 ft., *Hosie*, *Wilson* 3163. North Szechuan; without precise locality, *Potanin*. West Kansu; Ta-tung Range, near Chobsen, *Przewalski* (*fide* Maximowicz).

In the species of *Aculeatae* so far discussed the stem—in reality, a compound scape—may have all the pedicels short or very short, or may have them long or very long; occasionally, when the pedicels are very long, the base of the central compound scape is surrounded by a number of long, slender, simple scapes, situated in the axils of the radical leaves. In *M. latifolia*, *M. sinuata* and *M. speciosa* only short stem-pedicels occur, and no specimens with simple radical scapes have been met with. In

M. aculeata the stem-pedicels are usually short, less often long; when the pedicels are long, occasionally there are a few simple basal scapes as well. In *M. Prattii* one instance—and that a recurring one—of the condition with long pedicels and simple basal scapes in addition to the central stem has been recorded. In *M. rudis*, on the other hand, the condition with a central stem and short pedicels has not been met with; all the specimens seen have long stem-pedicels, with, in addition, simple scapes round the base of the stem. In *M. horridula* we meet, for the first time, a further development. In the state of this species which has to be regarded technically as "typical," because of its being the state to which the original diagnosis of the species alone applies, there is no central stem—or compound scape—at all; the scapes are all simple, 1-flowered and radical. Growing side by side with the plants in which all the scapes are radical we find others agreeing with the simple-scaped plants in every respect save in having a central stem with long pedicels in addition to a number of simple scapes; these agree in habit, though not in foliage, nor as regards their style, with *M. rudis*. Along with these plants we find growing still others, exactly the same as regards leaf and flower and fruit, but with short-pedicelled flowers on the main-scape, usually, though not always, all ebracteate, and usually, though not always, without any accompanying simple and solitary-flowered basal scapes. That all three states are conditions of the same natural species is, in the writer's opinion, hardly open to discussion. It was felt convenient, however, in 1896 to recognise two varieties within the species. The first of these varieties was made to include only those specimens in which all the scapes are simple and have solitary flowers; the second to include all those specimens which have a compound scape, whether accompanied or not by simple basal scapes. The reason for the recognition of the first variety was a two-fold one. On the one hand, this variety corresponds precisely with what was described in 1855 as *M. horridula*, and what had for forty years been accepted as *M. horridula*; on the other hand, the character by which the variety may be recognised seemed then to be unique within the group *Aculeatae*, to which *M. horridula* belongs. The ground for the treatment of the remaining states of *M. horridula* as one variety, and not as two or more varieties, was that, although the same degree of variation is manifested within the limits of typical *M. aculeata*, in the case of that species this variability had not given rise to a necessity for the segregation of taxonomic varieties.

In the *Pflanzenreich* a somewhat different view has been taken. The treatment there accorded to what is technically the typical variety of *M. horridula* is identical with that proposed in 1896 and continued in 1906. The treatment accorded to what in 1896 and again in 1906 was recognised as var. *racemosa* is, however, modified in the *Pflanzenreich* in two respects. In the first place the state in which the central compound scape is accompanied by a number of simple basal scapes, is separated, to some extent, from the state in which the central compound scape has no accompanying basal scapes: further, only the former of these

two states is treated as referable to *M. horridula*, the latter being considered a distinct species.

So far as concerns that portion of var. *racemosa*, as defined in 1896, which, in the *Pflanzenreich*, has been left in *M. horridula*, another difference of opinion has been expressed. It is suggested in the *Pflanzenreich* that this state, which is there treated as a variety of *M. horridula*, may be merely an abnormal condition of a plant in which normally all the scapes are simple. In 1906, on the other hand, the opinion was expressed that it is the racemose condition which is normal, and that the condition which for technical reasons we are under the necessity of describing as the "typical" form is a reduced condition. The evidence available since 1906 has tended to confirm this view. Seeds, accompanied by specimens, have on several occasions since then reached this country from the neighbourhood of Gyantse and elsewhere in southern Tibet. These specimens have always been referable to typical *M. horridula* because they have always had only simple 1-flowered scapes. But no one has so far been able to raise a plant with simple 1-flowered scapes; the plants raised have always formed central stems with raceme-like cymes of ebracteate flowers, and have been treated by cultivators as belonging to *M. racemosa*, Maxim.

Regarding the general question as to whether the state in which all the scapes are simple and radical can be kept apart from either of the two states in which there is a central raceme-like compound scape, it has to be noted that even in Tibet, where the form with only simple scapes is the most common of the three, forms with raceme-like scapes have been met with in the Eastern portion of that table-land at Kon-chin-la, in the central portion in Amdo, and in the southern portion near Lhassa. On the high alps of Sikkim and Chumbi, where *M. horridula* extends through the passes from Tibet to the southern face of the Himalayas, all three states occur, but it is the state in which there are only simple 1-flowered scapes which is now least common. In the corresponding area in Batang and in Western and Northern Szechuan, where again, notwithstanding a doubt expressed in the *Pflanzenreich*, the species overflows from Tibet, we find both of the states which in that work are left in *M. horridula*, but it is the state which is distinguished by Dr. Fedde as *M. horridula*, var. *abnormis* which is the more usual of the two. The difficulty met with in distinguishing between this latter state and the state to which the name *M. racemosa* is restricted in the *Pflanzenreich*, is enhanced by the inclusion in that work, under *M. racemosa*, of one specimen, collected by Potanin in Northern Szechuan, in which the base of the stem is surrounded by a number of simple scapes situated in the axils of the radical leaves. The gathering of which this specimen forms part was issued by Maximowicz himself as *M. racemosa*, so that it is clear that, by its author, *M. racemosa* was held to include both the state described in the *Pflanzenreich* as *M. racemosa* and that described there as *M. horridula* var. *abnormis*. Nor is this all. The specimens at Kew, collected at Kon-chin-la in Eastern Tibet by Przewalski, which were issued by Maximowicz as *M. racemosa*, have no central

stem; all the scapes are simple and 1-flowered, and the specimens are identical with "typical" *M. horridula*, as originally defined by Hooker and Thomson, and as collected in Tibet by Wellby, Thorold, Littledale, Rockhill, Sven Hedin, Walton and others. It therefore seems clear that although Maximowicz in 1876 based his original diagnosis of *M. racemosa* on specimens with a central compound scape, he laid as little stress ultimately upon this character as did Hooker and Thomson, who had before them in 1855, when their original diagnosis of *M. horridula* was published, specimens with a central stem, collected by Hooker himself at Kan-ko-la in Sikkim on August 22, 1849. Since in both cases the same species was in question, and in both cases the range of variation in habit was equally well known, the question arises why in 1889 Maximowicz still considered *M. racemosa* to be specifically different from *M. horridula*. The answer is supplied by Maximowicz himself; in *M. racemosa*, as Maximowicz was aware, there are always more than four petals, whereas by implication Hooker and Thomson suggest that in *M. horridula* there are normally only four petals. It is to be remembered, however, that the fact that in *M. horridula* there are more than four petals was known to and stated by Hooker and Thomson in 1855. The difference between these authors and Maximowicz is that they thought to be an abnormality, a character which Maximowicz from the outset treated as a normal one.

A slight misapprehension appears to have crept into the scholarly revision in the *Pflanzenreich* in connection with *M. racemosa*, Maxim. It is remarked that the authority for the occurrence of *M. racemosa* in Kansu is a statement to that effect made by the writer in 1906. The statement was made by Maximowicz in 1876, and the *locus classicus* of *M. racemosa* is near the temple of Chobsen, which is situated in Western Kansu, to the east of Kuku-nor and on the western slope of the mountain chain skirted by the Ta-tung River.

It seems possible that another misapprehension may have occurred. Dr. Fedde has figured in the *Pflanzenreich* a capsule of one specimen referred by him to *M. racemosa*.* This figure shows that in the plant in question the style is much longer and thinner than the style in the specimen of *M. racemosa* figured by Maximowicz in 1889,† which agrees well with the figures given by Dr. Fedde of the style of *M. horridula*. We know that the capsule figured as that of *M. racemosa* in the *Pflanzenreich* was not borne by the specimens collected by Przewalski and Potanin, since in both of these plants the styles are like that of typical *M. horridula* on the one hand and of Maximowicz's figure of *M. racemosa* on the other. It must, therefore, have been borne by one of the three specimens cited by Fedde as having been collected in Szechuan by Soulié. The figure given by Fedde, though unlike the capsule of *M. racemosa* as figured by Maximowicz, is, however, an accurate representation of the capsule of *M. Prattii*, so that

---

* Das Pflanzenreich [IV, 104], p. 257, fig. 35 M.

† Flor. Tangut. t. 9, figs. 1, 2 a and b.

one at least of the specimens collected by Soulié should belong to that species. It is not impossible, from the localities in which they were collected, that all three are *M. Prattii*, which species we know, moreover, to have been collected by Soulié near Tachien-lu (*Soulié* n. 635). *M. racemosa*, Fedde, is therefore a composite species including *M. horridula*, var. *racemosa*, in part, and *M. Prattii*. It would follow, however, that the specimens of *M. Prattii* thus included in *M. racemosa* have ebracteate pedicels. This we know is not impossible, since a *Meconopsis*, stated to have had purple flowers with white stamens, was figured as *M. racemosa* in 1909.* The plant in question could hardly have been mistaken for *M. racemosa* had its flowers been subtended by bracts; the fact that it is said to have had white stamens—no doubt "white anthers" was meant—shows, however, that it was *M. Prattii*, described above, not the plant with yellow anthers and dark blue petals to which the name *M. racemosa* is usually applied in our gardens.

This particular *Gardeners' Chronicle* reference renders it necessary to call attention to a point which should not be overlooked. It is one which, for the moment, is not very important, but which may prove to be of consequence at some future date. We know that the plant figured by Maximowicz as *M. racemosa* in 1889 is only a form of *M. horridula*, described by Hooker and Thomson in 1855. We know that the plant collected in Eastern Tibet by Przewalski, and the plant collected by Potanin in Northern Szechuan, both of which were distributed by Maximowicz as *M. racemosa*, also belong to *M. horridula*, Hook. f. & Thoms. We know, besides, that *M. horridula* is essentially a Tibetan species, and that its occurrence on the high alps of the Eastern Himalaya and of Western China is but the result of local overflow across the passes leading from Tibet. This being the case, it is remarkable that the locality in which the specimens upon which *M. racemosa* was based should be situated in the Province of Kansu, well to the east of Kuku-nor. Until the contrary has been proved we must accept the figure of *M. racemosa*, given in the *Flora Tangutica* by one of the most careful students of Asiatic plants, who was, moreover, the author of the species concerned, as conveying an accurate conception of the *Meconopsis* collected by Przewalski at Chobsen and described as *M. racemosa* in 1876.

But the writer has not seen a specimen of the original *M. racemosa* from Chobsen, in Kansu, in any of the herbaria he has been able to examine, nor is there any indication that duplicates of this Chobsen gathering have ever been issued to other herbaria. It is not definitely stated that the figure which appears in the *Flora Tangutica* was prepared from a specimen of the original Chobsen gathering. Moreover, no one since Przewalski has collected anywhere in Kansu specimens of the Tibetan *Meconopsis* with dark blue flowers and yellow anthers, figured and distributed by Maximowicz as *M. racemosa*.

On the other hand it is now known that a *Meconopsis* with grey

---

* Gardeners' Chronicle, 1909, vol. xlvi, p. 91, fig. 40.

anthers, which bears a considerable superficial resemblance to the condition of the Tibetan yellow-anthered *M. horridula* in which the flowers are borne on a central compound scape, is widely distributed in Kansu. So striking in some cases is the resemblance between these very different species that in so authoritative a work as the *Pflanzenreich* the two appear to have been confused, while a careful observer in one English garden has mistaken the one for the other.

Therefore until a specimen of the original plant from Chobsen, on which *M. racemosa* was based, can be studied afresh in the light of the knowledge of the genus acquired since 1876, or until specimens of the plant figured as *M. racemosa* in 1889 have been communicated from the Province of Kansu, some doubt must remain as to the incidence of the name used by Maximowicz. Should it be found that, after all, the specimens on which *M. racemosa* was based in 1876 belong to the species with grey anthers and with the capsule figured by Dr. Fedde, the name *M. racemosa*, in familar use among cultivators of *Meconopsis*, will acquire a new significance. The employment of the name in gardens will cease to be superfluous as it is at present, but, unless the example of Mr. T. Smith in the *Gardeners' Chronicle* for 1909 be followed, will be erroneous.

6. Primulinae, Prain, l.c., p. 349; Fedde, l.c., p. 259 (sect.).

15. Meconopsis Forrestii, Prain, Kew Bull. 1907, p. 316; Forrest in Gard. Chron. 1911, vol. l. p. 51. *Capsula* (anno 1907 ignota) anguste cylindracea, parce setosa, 3–5 cm. longa, 5 mm. lata, pedicellis rigidis 3–4 mm. longis demum erectis et ad caulem stricte adpressis suffultae.

South-Western China: Yunnan; eastern flank of the Li-kiang Range, 10,000–11,000 ft., *Forrest* 2314; mountains in the north-east of the Yang-tse bend, *Forrest* 10799; Chung-tien Plateau, 12,000–13,000 ft., *Forrest* 12507, 12672.

The first gathering of this species was made in June, 1906, in a locality 27°12′N. The field-note with the specimens (*Forrest* 2314) describes it as a plant 6–15 in. high, with pale blue flowers, the filaments of a deeper shade, and the anthers blue; in the actual specimens, however, the anthers are orange-yellow. The second gathering was made in August, 1913, in a locality 27°45′N. The field-note with the specimens, which are in fruit, describes the plant as 12–24 in. high. Mr. Forrest has met with this species twice since, during his 1914 journey. The change of position of the pedicels, which in flower are spreading or even somewhat reflexed, to the erect virgately adpressed one assumed when the capsules are ripe, is very striking. In all of the gatherings of *M. Forrestii* there is only a central compound scape. In this species only two of the four placentae are markedly intruded, the other two are almost nerviform.

16. Meconopsis lancifolia, Franch.: Fedde, l.c., p. 259, fig. 35 p (1909).

Western China: Yunnan; Yen-tse-hay, 10,500 ft., *Delavay* 2080; Fang-yang-chang, 10,500 ft., *Delavay*; Tsang-chan, 13,000

ft., *Delavay;* Kou-la-po, 11,500 ft., *Delavay*; Mekong-Salwin Divide, lat. 27°–27°30′N., 14,000–15,000 ft., *Forrest* 469; Tali Range, 11,000–13,000 ft., *Forrest* 1950, 1999, 13517. Western Szechuan; between Batang and Ta-chien-lu, *Wilson* 1364; Wa-san Country, at Wen-chuan-hsien, 11,000–13,000 ft., *Wilson* 3027.

In *M. lancifolia* we experience the variation in habit already discussed under *M. horridula.* The gathering by Delavay on Yen-tse-hay above Lankong (*Delavay* n. 2080) and that by Forrest of June, 1906, on the eastern flank of the Tali Range (*Forrest* n. 1950) have central compound scapes only; in that by Forrest of July and August, 1906, from the same locality as the preceding (*Forrest* n. 1999) some of the specimens have, in addition, one or two simple basal scapes. These July and August plants, moreover, have the terminal flower 5-petalled. But in the case of the two gatherings of this species from Szechuan we find in that collected by Wilson in July, 1904 (*Wilson* n. 3164), either that all the scapes are simple, radical and 1-flowered, or that the central scape has but two lateral long-pedicelled flowers on the central scape, while this central scape is accompanied by a number of basal simple ones. In the gathering from Wen-chuan-hsien in the Wa-san country, made in July, 1908 (*Wilson* n. 3027), three out of four specimens have a central scape with only two lateral long-pedicelled flowers, the rest of the blossoms being borne by simple, 1-flowered radical scapes; the fourth specimen, however, has a several-flowered compound central scape unaccompanied by any basal simple scapes.

In facies, therefore, these Szechuan specimens of *M. lancifolia* closely resemble those of *M. Henrici* and of *M. impedita*, but are readily distinguished from the former by the very different anthers and the smaller number of petals, from the latter by the entire leaves, and from both by the narrower capsules and the much shorter styles, under $\frac{1}{5}$ in. long in *M. lancifolia*, over $\frac{1}{3}$ in. long in *M. Henrici* and *M. impedita.*

17. **Meconopsis lepida,** Prain; species e grege *Primulinarum* floribus pedicellis ebracteis in cymas racemiformes dispositis ad *M. Forrestii* et *M. lancifoliam* proxime accedens ab ambabus tamen foliis latioribus glabrescentibus vel glabris, petalis numerosioribus clare coeruleis, antherisque gilvis facillime distinguenda.

Herba biennis, inermis. *Rhizoma* dauciforme, elongatum, descendens. *Folia* omnia radicalia vel prope basin scapi aggregata, ovato-lanceolata, apice subacuta, basi cuneata vel sensim in petiolum attenuata, margine integra, supra viridia, subtus pallidiora, utrinque glabra vel hinc inde pilis adpressis perpaucis induta, 4–6 cm. longa, 1·75–2 cm. lata; petiolus glaber, 2·5–3 cm. longus. *Scapus* centralis, 12–15 cm. longus, glaber vel pilis simplicibus patentibus vel subretrorsis parce vestitus, florem terminalem 5 cm. latum suffulciens et triente medio pedicellos graciles 1-floros 1–5 cymosim emittens; pedicelli 1–3·5 cm. longi, glabri vel subpatenter hirsuti, flores laterales vix 3 cm. latos

suffulcientes. *Sepala* 2, ovata, glabra vel parcissime setosa, 1·25–1·75 cm. longa. *Petala* 7–8, oblonga, obtusa, majora 2·5 cm. longa, 1·75 cm. lata, intense coerulea. *Stamina* ∞. 6–seriata, filamentis intense coeruleis discretis glabris; antherae gilvae. *Ovarium* e carpellis 4 compositum, anguste ovoideum, parce hirsutum vel glabrum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis albidis; placentae subnerviformes; ovula plurima. *Capsula* elongata, angusta (*ex* Farrer). *Semina* nondum visa.—*Meconopsis*, sp. *M. Delavayi* affinis, Farrer in Gard. Chron. 1914, vol. lvi. p. 138, et 1915, vol. lvii. p. 110.

North-West China: Kansu; Thundercrown, on limestone cliffs, 12,000–13,000 ft., *Farrer* 123.

This charming species, Mr. Farrer notes, "has only been seen on the cooler slopes and rock ledges of the high limestones on Thundercrown, from 12–13,000. It was in splendour on June 20: practically all the seed was gone from the elongate narrow glabrous or very sparsely haired capsules by August 27." This species has the buff anthers and deep blue petals of the otherwise very different *M. psilonomma*, Farrer. Like that fine plant, it is unfortunately biennial and monocarpic.

18. **Meconopsis eximia,** Prain; species e grege *Primulinarum* floribus 7–8-petalis pedicellis ebracteis in cymam racemiformem dispositis cum *M. lepida* congruens ab ea tamen capsula late ovoidea foliis scapis ovarioque setoso-pilosis facillime distinguenda.

Herba biennis, inermis. *Rhizoma* dauciforme, elongatum, descendens. *Folia* omnia radicalia vel prope basin scapi aggregata, oblanceolata vel anguste oblongo-lanceolata, apice subacuta, basi sensim in petiolum angustiorem attenuata, margine integra, supra pallide viridia, subtus glaucescentia, utrinque setoso-pilosa, 6–10 cm. longa, 1·25–1·5 cm. lata; petiolus 2–3 cm. longus. *Scapus* centralis, 15–40 cm. longus, setis patentibus vel subretrorsis densius indutus, flores 3–5 subaequales nutantes 5 cm. diametro in cymam racemiformem dispositos suffulciens, saepius etiam scapis basalibus simplicibus 1-floris additis: pedicelli florum cymae graciles, 1·5–5 cm. longi, patenter setosi, ebracteati. *Sepala* 2, late ovata vel orbicularia, patenter setosa, 1·75 cm. longa. *Petala* 7–8, saepius late oblonga, obtusa, margine integra vel minute crenulata, basi rotundata, 2·75 cm. longa, 2 cm. lata, nonnunquam anguste oblonga, basi cuneata, 2·75 cm. longa, 1·75 cm. lata, intense purpureo-coerulea. *Stamina* ∞, 4-seriata, filamentis intense purpureo-coeruleis discretis glabris; antherae cinereo-gilvae. *Ovarium* e carpellis 4 compositum, late ovoideum, dense setosum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis albidis; placentae nerviformes; ovula plurima. *Capsula* ovoidea, 2 cm. longa stylo 5–6 mm. longo excluso, 1·25 cm. lata, dense patenter setosa. *Semina* pallide cinnamomea, incurva; testa reticulata.

South-Western China: Yunnan; Mekong-Salwin Divide, Lat. 27° 40′ to 28° 10′ N, 12,000–14,000 ft., *Forrest* 13020, 13238; Chung-tien plateau, Lat. 27° 30′ N, 12,000 ft., *Forrest* 12691, 13352.

A very handsome species with deep blue-purple nodding flowers and grey-yellow anthers, affecting open, stony pasture-land.

19. **Meconopsis Henrici,** Bur. et Franch.: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 259 (1909); Wilson, Western China, vol. i. pp. 138, 199, et vol. ii. p. 9 (1913).

Western China: West Szechuan; near Ta-chien-lu, 11,000–14,000 ft., *Soulié* 523; *Bonvalot*; *Pratt* 25, 600: *Wilson* 3166; Ton-go-lo, 12,000 ft., *Wilson*; Pan-lan-shan, west of Kuan-hsien, 13,000–14,000 ft., *Wilson* 957; Ta-p'ao-shan, north-west of Ta-chien-lu, 12,000–15,000 ft., *Wilson* 3028.

In this species again the habit varies as it does in *M. horridula* among the *Aculeatae* and in *M. lancifolia* and *M. crimia* among the *Primulinae*. The usual condition is that in which, at the commencement of the flowering season, a single simple scape bearing a solitary flower appears in the centre of the crown; this is followed later by the elongation of a number of scapes whose buds are at first hidden among the crown-leaves in the axils of which they arise. These secondary scapes in fruit become nearly as long but are never quite so thick as the primary scape. Not infrequently, however, the original scape bears one or more lateral ebracteate pedicels. An instance of one lateral flower occurs in a specimen collected by Pratt in 1890 (*Pratt* n. 25); another case of one lateral flower on the central scape occurs on a specimen collected by Wilson in June, 1904 (*Wilson* n. 3166). In another gathering by Wilson, at Pan-lan-shan, west of Kuan-hsien, at 13,000–14,000 ft., consisting of five specimens obtained in 1908, in flower in June and in fruit in August, two have one lateral pedicel on the central scape, while one has four and another has five lateral pedicels, the two last thus possessing racemose cymes exactly as in *M. horridula*, var. *racemosa*.

This species was introduced to cultivation by Messrs. J. Veitch and Sons in 1906, but has not yet become generally established.

20. **Meconopsis primulina,** Prain: Fedde, l.c., p. 260, fig. 35 c (1909).

This species has not been met with since 1906. The flowers agree in colour with those of *M. lepida* and *M. psilonomma*. From the former it differs in having only simple 1-flowered scapes, of which, as in *M. Henrici*, the central is earlier in appearance and is more robust than the rest. Sometimes only the central scape is produced, when the plant closely resembles a small form of *M. psilonomma*; from that species, however, *M. primulina* is readily distinguished by its different ovary. The fruit of *M. primulina* is still unknown.

21. **Meconopsis psilonomma,** Farrer in Gard. Chron., 1915, vol. lvii. p. 110; species inter *Primulinas* scapo unico elato 1-floro insignis.

Herba inermis. *Rhizoma* oblongo-ovatum, brevius. *Scapus* solitarius, simplex, 6–9 dm. altus, parce setis subreflexis indutus. *Folia* omnia radicalia vel prope basin scapi aggregata, oblanceolata vel auguste oblongo-lanceolata, apice subacuta, basi sensim

in petiolum latum attenuata, margine integra, supra pallide viridia, subtus glaucescentia, utrinque parce setoso-hirsuta, 5–8 cm. longa, 1·25–1·5 cm. lata; petiolus 3–5 cm. longus. *Flores* singuli, intense coerulei, speciosissimi, 8–9 cm. lati. *Sepala* 2, extra sparse setosa. *Petala* 7–8, oblonga, obtusa vel retusa, 4·5 cm. longa, 2–2·5 cm. lata. *Stamina* ∝, 4-seriata, filamentis intense coeruleis discretis glabris; antherae gilvae. *Ovarium* e carpellis 4 compositum, late ovoideum, parce retrosetosum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis albidis; placentae nerviformes; ovula plurima. *Capsula* late obovoidea, 2·5 cm. longa stylo excluso, 1·75 cm. lata, parce retrorso-setosa. *Semina* cinnamomea, incurva; testa reticulata.

North-Western China: Kansu; Alps of Ardjeri, 11,500–12,500 ft., *Farrer* 255.

Mr. Farrer's field note describes this as "a superb species seen only once on one portion of a great grass slope in the Tibetan Alps of Ardjeri, beginning at the topmost limit of *M. punicea* (11,500 ft.) and ascending to the highest ridges at 12,500 ft., where *M. quintuplinervia* seemed pale and poor; . . . . . it is invariably single-scaped and single-flowered." The anthers in this species are a very pale buff, unlike those of any other member of the *Primulinae* group except *M. lepida*, Prain, another Kansu species.

22. **Meconopsis argemonantha**, Prain; species e grege *Primulinarum* proxime ad *M. primulinam* accedens sed foliis fere glabris subruncinatis petalisque albis facillime distinguenda.

Herba inermis. *Rhizoma* . . . *Folia* lanceolata, subruncinata, apice subacuta basi nunc cuneata et abruptius nunc attenuata et sensim in petiolum gracilem vel explanatum abeuntia; supra saturate viridia, subtus pallidiora, utrinque glabra vel prope basin secus marginem nervosque subtus pilis longioribus mollibus perpaucis induta, 6 cm. longa, 1·25 cm. lata; petiolus 2·75 cm. longus vel brevior. *Scapi* simplices versus apicem setis perpaucis sparse obsiti, ceterum glabri. *Sepala* . . . *Petala* 6–8, obovata, obtusa, margine crenulato-denticulata, basi late cuneata, 2·5 cm. longa, 1·5–2 cm. lata, alba. *Stamina* ∝, pauciseriata, filamentis albis gracillimis discretis glabris; antherae luteae. *Ovarium* anguste ovoideum, setis rigidis parce indutum; stylus elongatus, glaber; stigma capitatum lobis decurrentibus brevibus contiguis ex sicco pallide viridibus. *Capsula* . . . .

Eastern Himalaya: Monyul; Tawang district at Mipak Isan, 13,800 ft., in flower on 17 September, 1913. *Bailey* 6.

7. Bellae, Prain, l.c., p. 351, emend.; Fedde, l.c., p. 261 (sect.) Inermes; perennantes vel raro monocarpicae biennes; caules 0; folia integra, lobata vel pinnatisecta; flores purpurei vel coerulei petalis 4–5; styli distincti; capsula obconica, ovata, vel anguste cylindracea; rhizoma descendens.

23. **Meconopsis Baileyi**, Prain; species e grege *Bellarum* prope *M. impeditam* ponenda sed ovario dense adpresse setoso apte sejungenda.

Herba inermis. *Rhizoma* . . . *Folia* . . . *Scapi* graciles simplices setulis brevibus retrorso-patentibus induti. *Sepala* . . . *Petala* 4, ovato-oblonga, obtusa, margine secus latera integra ceterum minutissime denticulata, 1·25 cm. longa, 1·75 cm. lata, coerulea. *Stamina* ∝, pluriseriata, filamentis coeruleis gracillimis discretis glabris; antherae aureae. *Ovarium* ovoideum, 1 cm. longum, 8 mm. latum, setis adpressis gilvis dense vestitum; stylus brevis (2·5 mm. longus), crassus, glaber; stigma capitatum, lobis decurrentibus brevibus contiguis ex sicco purpureis. *Capsula* . . .

Tibet: Eastern Kongbo; Rong-chu Valley at Lunang, 10,500 ft., 94° 45′ W., 29° 45′ N., in flower on 10 July, 1913, *Bailey* 8.

24. **Meconopsis impedita**, Prain; species inter greges *Primulinarum* et *Bellarum* quasi medians ob capsulam *M. Henrici* in memoriam reducens sed foliis firmioribus margine lobulatis floribusque ad normam 4-petalis melius in grege *Bellarum* ponenda.

Herba biennis, inermis. *Rhizoma* dauciforme, elongatum, descendens. *Folia* omnia radicalia, ovato-lanceolata, apice acuta vel subacuta, basi sensim in petiolum late alatum attenuata, margine pinnatim lobulata vel grosse dentata lobulis obtusis, supra saturate viridia, subtus pallidiora interdum glaucescentia, utrinque parce setosa, 5–6 cm. longa, 1·5–2 cm. lata; petiolus 3–5 cm. longus. *Scapi* numerosi, 15–40 cm. longi, graciliores vel gracillimi, setis patentibus plus minusve induti, 1-flori. *Sepala* 2, suborbicularia, extra setosa, 8–9 mm. lata ac longa. *Petala* 4 rarissime 5, oblonga, obtusa, 2·25 cm. longa, 1·25 cm. lata, saturate coerulea. *Stamina* ∞, pluriseriata, filamentis intense coeruleis gracillimis discretis glabris; antherae luteae. *Ovarium* e carpellis 4 compositum, latius ovoideum, densius setosum; stylus elongatus; stigma clavatum lobis decurrentibus contiguis; placentae intrusae; ovula plurima. *Capsula* longe obconica, parce setosa, 1·8 cm. longa, 6 cm. lata.

South-West China: Yunnan; Tsekou, *Monbeig*; Mekong-Salwin Divide, Lat. 27°–28° N, 12,000–13,000 ft., on open stony barren limestone ridges, *Forrest* 459, 13,314: without precise locality, *Maire*, *Ward* 792.

This very distinct species might with almost equal propriety be placed either in the group *Primulinae* or in the group *Bellae*. The capsule and the long style closely resemble those of *M. Henrici* in the former group, but the very densely tufted leaves, which are of the same consistence as those of the *Bellae* and are, moreover, lobulate along the margins, coupled with the fact that the flowers are normally 4-petalous and the scapes are all simple, indicates the desirability of associating it with the latter rather than with the former group. The flowers are all 4-petalous except on one or two, not all, of the scapes in the specimens collected by Ward. Forrest in the field-note accompanying a somewhat imperfect specimen from the Mekong-Salwin Divide (*Forrest* n. 459), obtained in July or August, 1905, describes the scapes as being 6–10 in. high with deep rich blue pendulous

solitary flowers. In one of Maire's specimens the scapes are 15–18 in. high.

An imperfect specimen collected near the head-waters of the Rong-chu in South-Eastern Tibet, on Verma-la (Nyima-la), 15,000 ft., 94° 45′ W, 29° 37′ N, by Captain F. M. Bailey, in flower on 12 July, 1913, comes nearest to this species. The leaves are similar in shape, lobulation and indumentum, but are somewhat thinner; the indumentum of the scapes is the same, and the ovaries agree with those of *M. impedita*. The filaments, however, are considerably shorter. For the moment it is best treated as a variety of *M. impedita*:—

Var. **Morsheadii**, Prain; forma *M. impeditam* typicam in memoriam reducens sed floribus majoribus petalis pallidius coeruleis filamentis parum brevioribus.

Tibet: Eastern Kongbo; Verma-la, 15,000 ft., *Bailey* 9.

25. **Meconopsis bella,** Prain; Fedde, l.c., p. 261, fig. 35J (1909); Mottet in Rev. Hort. 1912, p. 205; Smith in Rec. Bot. Surv. India, vol. iv., p. 348 (1913).

This species has been met with again in Western Sikkim at Megu, 14,000 ft. (*Romoo* 834, 6443), and on a later occasion in Eastern Sikkim, at Tosa, Chakung Chu, 14,000–15,000 ft., usually in the moist crevieces of cliffs facing north, *Smith* 3926, 4084; *Ribu* 4463.

26. **Meconopsis concinna,** Prain; species e grege *Bellarum* ad *M. bellam* ipsam accedens sed foliis lanceolatis nec ambitu ovatis minus divisis vel integris, rhizomate breviore lobulato, capsulaque elongata anguste cylindracea valvis altius fissis facillime distinguenda.

Herba forsan biennis, inermis. *Rhizoma* subtuberosum, 1·5–2 cm. longum, in segmenta 2–3 crassiora divisum, descendens. *Folia* omnia radicalia, lanceolata, runcinata lobulis ovatis vel lineari-lanceolatis obtusis raro iterum divisis 3–7-jugis, nonnunquam aliquot vel omnia integra, supra saturate viridia, subtus glaucescentia, utrinque glabra, 1·5–2 cm. longa, 5 mm. lata; petiolus glaber, 1·5–2 cm. longus. *Scapi* numerosi, 5–15 cm. longi, gracillimi, glabri vel setis patentibus parce induti demum glabrescentes, 1-flori. *Sepala* 2, late ovata, extra parce hirsuta vel glabra, 7–8 mm. longa. *Petala* 4, late oblonga, obtusa, apice crenulata vel denticulata, 1·25 cm. longa, 1 cm. lata, coerulea purpureo suffusa. *Stamina* ∞, circiter 32, 4-seriata, filamentis coeruleo-purpureis discretis glabris; antherae cinerascentes. *Ovarium* e carpellis 4 compositum, anguste fusiforme, glabrum vel setis perpaucis obsitum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis; placentae nerviformes; ovula plurima. *Capsula* anguste cylindracea, glabra, 2·5–2·75 cm. longa, 4 mm. lata, ad medium usque valvarum dehiscens. *Semina* brunnea, incurva; testa striata vix reticulata.

South-West China: Yunnan; mountains in the north-east of the Yang-tse bend, Lat. 27° 45′ N. 13,000–14,000 ft., in flower in July, *Forrest* 10404; in fruit in September, *Forrest* 10979;

Chung-tien Plateau, 12,000 ft., *Forrest* 12670; mountains west of Feng-kou, 12,000 ft., *Forrest* 12706; Li-kiang Range, 12,000 ft., *Forrest* 12796.

The field-note accompanying flowering specimens of this pretty little alpine species (*Forrest* n. 10404) describes the scapes as from 3-6 in. long, and the flowers as deep purplish blue. The valves, in place of separating from the placental ribs at their apices only, do so for from one-third to one-half of their length, thus approaching the condition characteristic of *Cathcartia villosa*. The plant was met with in stony pastures and on the ledges of limestone cliffs. The appearance of the flowering, and especially of the fruiting specimens suggests that this is a biennial species. The three gatherings quoted last were obtained by Mr. Forrest in 1914.

27. **Meconopsis venusta,** Prain; species e grege *Bellarum* ad *M. concinnam* proxime accedens et primo intuitu pro varietate ejusdem habenda, sed foliis integris spathulato-ovatis nec lanceolatis vel pinnatisectis lobulis paucioribus inter se magis discretis et praesertim rhizomate multo majore dauciforme satis differt.

Herba biennis, inermis. *Rhizoma* elongatum, dauciforme, 12–14 cm. longum, 1 cm. crassum, descendens. *Folia* omnia radicalia, ima vel rarissime omnia integra lamina oblongo-ovata, obtusa vel subacuta, basi truncata, 1–3·5 cm. longa, 8 mm.-1 cm. lata, cetera pinnatisecta, lobis 1-2-jugis late oblongis vel orbicularibus obtusis, terminali 1 cm., lateralibus 3–5 mm. latis, supra saturate viridia, subtus intense glauca, utrinque glabra; petiolus late alatus, 4-6 cm. longus, glaber, margine membranaceus. *Scapi* numerosi, 15–20 cm. longi, graciles, glabri vel setis patentibus parce induti demum glabrescentes, 1-flori. *Sepala* 2, late ovata, extra glabra, 1·25 cm. longa. *Petala* 4, suborbicularia, obtusa, margine integra vel minutissime undulata, 2·25 cm. longa ac lata, intense rubro-purpurea. *Stamina* ∞, circiter 64, 4-seriata, filamentis intense rubro-purpureis gracillimis discretis glabris; antherae aurantiacae. *Ovarium* e carpellis 4 compositum, anguste fusiforme, setis patentibus densius indutum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis; placentae nerviformes; ovula plurima. *Capsula* anguste cylindracea, setis rigidis patentibus vestita, 3·5–4 cm. longa, 5 mm. lata, vix per trientem summum dehiscens. *Semina* cinnamomea, incurva; testa striata vix reticulata.

South-west China: Yunnan: mountains in the north-east of the Yang-tse bend, lat. 27° 45′ N, 13,000 ft., in flower in July, *Forrest* 10408; in fruit in September, *Forrest* 11008; Chung-tien Plateau, Lat. 27° 30′ N, 13,000–14,000 ft., *Forrest* 12685, 12686, 12993.

The field-note accompanying flowering specimens of this equally charming alpine species (*Forrest* n. 10408) describes the scapes as 9–14 inches long and the flowers as deep purplish wine-colour, the anthers being orange. It was met with in situations similar to the preceding; in stony limy alpine pastures and on humus-covered boulders. In this species the valves open to a greater extent than is usual in species of *Meconopsis*, but hardly

so far as to suggest a comparison with *Cathcartia*. The stout root-stock of this species, with its collar of the remains of leaves of an earlier season surrounding the crown of fresh leaves at their base, is so like that of *M. bella* as to suggest that *M. venusta* is also polycarpic. The three gatherings cited last were obtained by Mr. Forrest in 1914.

28. **Meconopsis Delavayi,** Franch.: Fedde, l.c., p. 261 (1909); Forrest in Gard. Chron. 1911, vol. l. p. 51, fig. 24; Mottet in Rev. Hort. 1912, p. 205; Gard. Chron. 1913, vol. liii. p. 357; Gard. Mag. 1913, p. 394; Garden, 1913, p. 275 cum icon.; Kew Bull, 1914, app. 3, p. 72. *Rhizoma* haud repens sed descendens, 3–4·5 dm. longum, 1·5 cm. crassum, pluriceps. *Scapus* solitarius, rarissime casu scapi 2, fructiger elongatus, ad 5–6 dm. altus. *Petala* 4, raro 5. *Capsula* (anno 1906 matura ignota) anguste cylindracea, erecta, 5–7·5 cm. longa, nonnunquam (*ex* Forrest) 15 cm. longa, 6 mm. lata.

South-West China: Yunnan; eastern flank of the Li-kiang Range, Lat. 27° 12′ N, 10,000–14,000 ft., *Delavay; Forrest* 2272, 10128.

The nearest alliance of this species has been somewhat doubtful. The flowers in some of the specimens originally collected by Delavay have 6–7 petals, and as a result we have here a repetition of the problem presented by the case of *M. horridula*, as to which Hooker and Thomson in 1855 considered the 6–8-petalous state an abnormality, whereas Maximowicz has decided that it is the normal condition. Treating the two cases as parallel the writer in 1896 included *M. Delavayi* in the *Primulinae* where it is usual to find more than 4 petals in the flowers. Now that ample suites of specimens have been communicated by Forrest from the *locus classicus* of the species, it is clear that the cases are not parallel; in *M. Delavayi* the petals are normally 4 or occasionally 5, but the cases with 6–7 petals are abnormal. The species is therefore better placed in the group *Bellae*, though within that group it stands somewhat apart in having, as a rule, a solitary scape to each crown, and in having entire leaves. This last feature is not, however, quite unique, for the leaves both in *M. venusta* and in *M. concinna* may at times be entire as in *M. Delavayi*. The species has been introduced to European gardens through the Royal Botanic Garden, Edinburgh, by seeds collected by Mr. Forrest.

§§ **POLYCHAETIA,** Prain in Ann. Bot. vol. xx. p. 352 (sect.); Fedde, l.c., p. 262 (subgen.).

8. Grandes, Prain, l.c., p. 352; Fedde, l.c., p. 262 (sect.).

29. **Meconopsis integrifolia,** Franch.: E. H. Wils. in Gard. Chron., 1905, vol. xxxvii. p. 291, fig. 121; Tallack, l.c., p. 317, E. H., l.c., et Challis, l.c., p. 341, et Veitch, l.c., vol. xxxviii. p. 32; Garden, 1905, vol. xlvii. p. 286 cum icon.; E. W. Meyer in Gartenw. 1905, vol. ix. p. 534 cum icon. col.; Gard. Album, 1906, t. 5; Veitch, Novelties 1907, p. 17; Rev. Hort. Belg. 1907, p. 189; Trib. Hortic. 1908, tt. 90, 91; Fedde, l.c. p. 262, fig.

35 E (1909); Jenkins in Gard. Chron. 1909, vol. xlvi. p. 146, fig. 60; Forrest, l.c., p. 339 cum icon.; anon. l.c., p. 358 partim; Divers, l.c., p. 378; Baker, l.c., p. 399; Jenkins, l.c., p. 440; Mottet in Rev. Hort. 1912, p. 204; Wilson, Western China, vol. i. pp. 138, 181, 199, et vol. ii. p. 9 (1913); Farrer in Gard. Chron. 1914, vol. lv. p. 318.

var. **Souliei,** Fedde, l.c. (1909).

The variety described by Dr. Fedde, which he suggests may be a distinct species, does not appear to have yet been introduced to European gardens, nor has the writer seen specimens.

What may perhaps prove to be another variety of *M. integrifolia,* with racemiform in place of umbelliform cymes, has been reported by the late Lieut. J. W. Brooke from the Balang Range in Kansu.

In 1907 Mr. R. H. Beamish crossed this species with *M. grandis* in his garden at Ashbourne, near Cork. The hybrid flowered there for the first time in May, 1909.

Meconopsis grandis × **integrifolia** aut **integrifolia** × **grandis**; hybrida arte inter *M. grandem*, Prain et *M. integrifoliam*, Franch. in horto Beamishiano facta.

Herba perennis, pubescens. *Rhizoma* coarctatum vestigiis foliorum vetustorum instructum. *Folia* radicalia 8–12, subrosulata, apice acuta, basi in petiolum attenuata, margine integra, 15–18 cm. longa, 3–4 cm. lata; petiolus 6–8 cm. longus. *Caulis* evolutus, 18–25 cm. longus, inferne nudus, apice foliis sive bracteis floralibus 4–5 foliis radicalibus conformibus nisi sessilibus et parum minoribus ornatus. *Pedicelli* 4–5, 25 cm. longi, 1-flori. *Sepala* 2, pubescentia, ovata, 3 cm. longa. *Petala* 6–8, intus citrina basi ocello triangulari pallide purpureo notata, extra purpurascentia, ovato-oblonga, 7–8 cm. longa, 5–6 cm. lata. *Stamina* ∞, pluriseriata, dense compacta filamentis discretis glabris citrinis purpureo suffusis; antherae aeneae. *Ovarium* subcylindricum, parce pilosum. *Stylus* obsoletus: stigma depresso-dilatatum lobis radiantibus divaricatis. *Capsula* lineari-oblonga, parce pilosa, 3–4 cm. longa.—*M. integrifolia*×*grandis*, Paine in Gard. Chron. 1911, vol. l. p. 22, fig. 14; Kew Bull. 1912, app. 3, p. 54. *M. grandis* × *integrifolia*, Beamish in litt.

Though stated by Mr. Paine, l.c., in 1911, to have been the cross *integrifolia* × *grandis*, Mr. Beamish, in announcing the success of his effort, described it as being the cross *grandis* × *integrifolia*. Whether the parentage were the one or the other the plant exhibits a striking mixture of the characters of the two parents. The leaves on the whole, and the habit of the plant follow *M. integrifolia*, as do the petals save for the purple flush on the outer side. The anthers, on the other hand, follow *M. grandis*, as does the pistil except for the absence of style. The most interesting and most important particular in which *M. Beamishii* has taken after *M. grandis* is in its proving polycarpic. Writing on May 21, 1909, Mr. Beamish intimated that he had discovered a small crown springing from the base of the plant, and in Mr. Paine's note published on July 15, 1911, it is stated that the hybrid had definitely assumed the character of a per-

ennial. It proved of more vigorous growth than either parent until 1914; during the winter of 1914–15 it unfortunately perished.

30. **Meconopsis pseudointegrifolia,** Prain: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 263 (1909). *M. integrifolia*, Bulley in Gard. Chron. 1905, vol. xxxvii. p. 200, 325 partim; Masters, l.c. 1906, vol. xxxix. p. 313; anon. l.c. 1911, vol. l. p. 358 partim: nec Franch.

South-eastern Tibet: Kham; in the Ra-chu valley, near the sources of the Mekong, Lat. 29° 30′ N., Lon. 97° 30′ E., 11,000–12,000 ft., *Koslov.*

South-west China: Yunnan; Chung-tien Plateau, Lat. 27° 30′ N, *Forrest* 12,522; Mekong-Salwin Divide, Lat. 28° 10′ N, 13,000 ft., *Forrest* 13,311; without precise locality, *Monbeig.*

As has been pointed out in the *Pflanzenreich* this species was erroneously stated in 1906 to be from South-western instead of South-eastern Tibet. In the Gardeners' Chronicle for 1911, l.c. the view was once more expressed that this may be only a form of *M. integrifolia.* The species has, however, been met with again by Père Monbeig in South-western China, and his material indicates that the suggestion alluded to is untenable. Monbeig's plant, however, shows that the plant as grown in this country was not "in character"; in the wild state the flowers are in 5–7-flowered umbelliform cymes in the axils of a fascicle of leafy bracts, just as in *M. integrifolia* and in *M. grandis.* Mr. Forrest's specimens of 1914 in flower (*Forrest* n. 12522), and in fruit (*Forrest* n. 13311), are exactly like Père Monbeig's plant.

31. **Meconopsis grandis,** Prain: Bulley in Gard. Chron. 1905, vol. xxxvii. p. 397; Fedde, l.c. p. 263, fig. 35 D (1909); Mottet in Rev. Hort. 1912, p. 205.

32. **Meconopsis simplicifolia,** Walp.: Fedde, l.c., p. 263, fig. 35 F (1909); Bot. Mag. t. 8364 (1910); Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 171 (1911); Mottet in Rev. Hort. 1912, p. 203; Smith in Rec. Bot. Surv. Ind. vol. iv. p. 348 (1913). *Polychaetia scapigera,* Wall. Cat. sub 8125 (1830).

This species has been raised in the Royal Botanic Garden, Edinburgh, from seeds collected by Captain F. M. Bailey, on Pen-la, Lon. 92° 15′ E, Lat. 27° 57′ N, at 17,000 ft., on the Subansiri-Manás Divide, in September, 1913. It has also been raised at Edinburgh from seeds received by Professor Balfour from the Tibeto-Yunnan frontier. The plants flowered in the Alpine collection there in October, 1911, and agreed in every detail with the specimens already known from Nepal, Sikkim, Chumbi and the Tibetan districts of Khamba and Phari. The considerable extension of its area towards the east indicated by these recent specimens suggests that *M. simplicifolia,* like *M. horridula,* may be essentially a Tibetan plant, and that its presence on the southern aspect of the Himalaya from Nepal to Chumbi may be due to overflow across the high passes. The authority for the name now used for this species has, in the *Pflanzenreich,* been inadvertently attributed to Mr. G. Don, who treated it as a *Stylophorum.*

33. **Meconopsis quintuplinervia,** Regel, Gartenfl. vol. xxv. p. 291, t. 880, figs. b, c, d (1876); Maxim. Fl. Tangut. p. 34, t. 23, fig. 27 (1889); Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2, p. 321 (1896); Flora and Sylva, vol. iii. p. 84 (1905); Prain in Ann. Bot. vol. xx. p. 354 (1906); Mottet in Rev. Hort. 1912, p. 203. *M. quintuplinervis*, Diels in Engl. Jahrb. vol. xxix. p. 354 (1901), et vol. xxxvi. Beibl. n. 82, p. 46 (1905); Fedde, l.c. p. 264, fig. 35 G (1909); Farrer in Gard. Chron. 1914, vol. lvi. p. 318, fig. 126, et 1915, vol. lvii. p. 1.

NORTHERN AND WESTERN CHINA: Shensi; Mt. Thae-pei-san, 10–20 August, 1894, *Giraldi* (Herb. Biondi, n. 766); Pao-ki-san District, on Mt. Abiao-wang-san, July, 1899, *Scallani* (Herb. Biondi, n. 4491); eastern slopes of Mt. Ngo-san, August, 1899, *Giraldi* (Herb. Biondi, n. 4492); Mt. Huan-ton-san, July, 1900, *Giraldi* (Herb. Biondi, n. 7032). Kansu; Ta-tung, 9,500-11,000 ft., *Przewalski, Potanin;* Hong-chiao Pass in the Balang Range, 14,000 ft., *Brooke;* Alps of the western border of Kansu, 9,000-12,000 ft., and on the Min S'an Alps, 10,000 ft., *Farrer* 118; Sining district, 11,000 ft., *French Ridley* 18. Szechuan; Tsaku-lao, *Bock and Rosthorn.*

TIBET: Amdo, 9500–11,000 ft., *Potanin.*

This species was originally found in Kansu by Przewalski and was first described in 1876 from a plant raised in the Imperial Botanic Garden at Petrograd from seed communicated by that explorer. Later it was met with by Potanin in Tibet. In the figure originally published by Dr. Regel, the ovary is shown with a distinct though short style, and in the text the existence of a style is mentioned. This statement is repeated in the description published by Mr. Maximowicz in 1889, and has been accepted in the account of the genus published in 1906 and in the *Pflanzenreich* text of 1909.

During Mr. E. H. Wilson's journey in China in 1908, that traveller made the acquaintance of the late Mr. J. W. Brooke and learned from him that when travelling in Kansu another species of *Meconopsis* had been met with. The species being new to Mr. Wilson, Mr. Brooke at his request sent to Kew a photograph and a specimen of the plant. These showed that the species in question is *M. quintuplinervia*, and showed, moreover, that in this plant the stigma is sessile as it is in *M. integrifolia* and in *M. punicea*, and that the *Gartenflora* figure is in this particular erroneous. It is to be noted, however, that, although Dr. Regel's error has found its way into the text of the *Pflanzenreich*, the figure of the capsule given in that work is accurate. To Dr. Fedde we further owe the first intimation of the fact that *M. quintuplinervia* is common in Shensi as well as in Kansu.

Yet another misapprehension with regard to this species has been removed by Mr. Farrer. Owing to the fact that the plant, when first introduced to cultivation, had proved monocarpic, the possibility of its being so in the wild state was suggested in 1906 and adopted in the *Pflanzenreich*. Fortunately Mr. Farrer is able to assure us that in the wild state *M. quintuplinervia* is undoubtedly polycarpic, and when regard is had to its natural

beauty, it is to be hoped that its re-introduction may lead to its permanent establishment in our gardens. Mr. Farrer remarks that on the occasion of a previous introduction to cultivation, *M. quintuplinervia* was confused with *M. simplicifolia*. This confusion did not take place when the species was first introduced by Przewalski forty years ago. Perhaps, however, Mr. Farrer may refer to some subsequent introduction, the record of which has escaped Dr. Fedde and the writer.

An inadvertent modification of Dr. Regel's original specific name, in a paper by Professor Diels published in 1901, has found its way into the *Pflanzenreich*, and the adoption of this erroneous orthography in the Gardeners' Chronicle may, unless timely attention be paid to it, give rise to yet another misapprehension.

34. **Meconopsis punicea,** Maxim.: Garden, 1905, vol. xlvii. p. 318 cum icon; Riebe in Gartenw. 1906, pp. 273, 274; Fedde, l.c., p. 265, fig. 35 II (1909); Mottet in Rev. Hort. 1912, p. 205; Wilson, Western China, vol. i. pp. 138, 181 et vol. ii. p. 9 (1913); Farrer in Gard. Chron. 1915, vol. lvii. p. 1.

When writing to Kew from Chen-t'u on October 28th, 1908, the late Mr. J. W. Brooke enclosed, along with a photograph of a plant of *M. quintuplinervia*, Regel, *in situ* on a hillside in the Hung-chiao Pass, a second photograph showing a number of plants of different species of *Meconopsis* brought together from various localities on the Balang Range.* One of these is *M. punicea*, Maxim., which is represented by three examples. The prevalence of this species in the province of Kansu has more recently been confirmed by Mr. Farrer. Although Mr. Brooke states that there are six different species in his group, the writer has only been able to distinguish three. These are *M. punicea*, Maxim., which is readily recognisable; *M. quintuplinervia*, Regel, also readily identifiable because of the accompanying photograph of a single plant, the latter being verified by a corresponding specimen; and *M. integrifolia*, Franch. In this instance, however, the photograph reveals a form of *M. integrifolia* that has not been encountered by other travellers; in place of the subumbellate cyme with large leafy bracts subtending the pedicels we have in this case a raceme-like cyme of flowers as in the unusual condition of *M. Henrici*, Bur. & Franch., obtained by Mr. E. H. Wilson at Pan-lan-shan, in Western Szechuan, where that traveller also found *M. punicea* growing in abundance. If there be other species in the group it is not possible to discriminate them. There are at Kew specimens or drawings of three other Kansu species, *M. Pratti*, *M. lepida* and *M. psilonomma*, the first known from specimens collected by Mr. Purdom, the others from specimens communicated to Professor Bayley Balfour by Mr. Farrer. In addition to the species men-

* This interesting photograph was published in 1911 as *Some poppies near the snow-line* in Ferguson: Adventure, Sport and Travel on the Tibetan Steppes, p. 174. It is possible that by 'six species' Mr. Brooke really meant 'six plants'; the photograph shows three of *M. punicea*, two of *M. quintuplinervia* and one of a racemiform condition of *M. integrifolia*.

tioned, the same province contains the *locus classicus* of the original type of *M. racemosa*, Maxim.

9. Torquatae, Prain, l.c., p. 355; Fedde, l.c., p. 265 (sect.).

35. **Meconopsis torquata,** Prain: Fedde, l.c., p. 265 (1909). This species has not been collected since 1904.

36. **Meconopsis discigera,** Prain: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 266.

This fine species has been introduced to cultivation by the Royal Botanic Garden, Edinburgh. It has been collected again in Sikkim on Guch-la, 16,000 ft., *Romoo* 1036, on the second occasion in flower. The sepals are ovate, hirsute externally, 1 in. long, $\frac{3}{4}$ in. across; the petals are yellow, wide ovate, 2 in. long, $1\frac{1}{2}$ in. wide. The plant is polycarpic.

10. Robustae, Prain, l.c., p. 357; Fedde, l.c., p. 267 (sect.).

37. **Meconopsis superba,** King: Fedde, l.c., p. 267 (1909). This species has not been met with since it was first collected in 1884 in Bhutan.

38. **Meconopsis paniculata,** Prain: Fedde, l.c., p. 267, figs. 34 E, F (1909); Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 171 (1911); Mottet in Rev. Hort. 1912, p. 204; Smith in Rec. Bot. Surv. India, vol. iv. p. 347 (1913).

It has already been explained that the condition recognisable as *M. paniculata* proper, with compound cymules in the axils of the leafy bracts, is hardly separable as a variety from the form recognised in 1896 as var. *elata*, in which the cymules are simple. By a regrettable error the differential character which distinguishes the original *Papaver paniculatum*, D. Don, has been used in the account of the genus published in 1906 (Ann. Bot. vol. xx. p. 358) in place of the character which really distinguishes var. *elata* from Don's original plant; this error unfortunately has not been noticed in the *Pflanzenreich*. For the character "flores in cymas laxe paniculatas dispositi caeterum typi," which is given in the Annals of Botany, l.c., should be substituted the following:—

Var. **elata**, Prain, Journ. As. Soc. Beng., vol. lxiv. pars. 2, p. 316; flores in cymas simplices dispositi, pedicelli saepius solitarii nonnunquam bini, patentes, sub anthesi foliis floralibus haud vel vix longioribus, fructigeri elongati adscendentes vel virgatim erecti.

Experience in gardens since 1906 has indicated that it is more desirable than had been thought to keep the two forms varietally apart.

Deviation from the normal 4-petalous condition appears to be extremely rare in the species which constitute the group *Robustae* as compared with the members of the group *Bellae*, and to be rare even as compared with the normally 4-petalous species which occur in the groups *Aculeatae* and *Primulinae*. In the only instance with which the writer has met, the deviation has not taken the form of multiplication but of reduction in

number of petals. The example was communicated to Kew by Mr. R. H. Beamish in 1907. The two outer petals alternating with the sepals are normal, but the two inner petals opposite to the sepals are replaced, on one side by a solitary abnormal stamen with a petaloid filament and broad connective, on the other side by two perfect stamens indistinguishable from the normal stamens save by their definite position with relation to the petals and to the components of the outer series of filaments in the androecium proper.

39. **Meconopsis robusta,** Hook. f. & Thoms.: Fedde, l.c., p. 268, fig. 34 D (1909); Mottet in Rev. Hort. 1912, p. 204.

When using the *Pflanzenreich* students should note that the name *M. robusta* was not, as the text at first sight seems to imply, applied by the late Dr. Wallich either to the plant from Gossain Than in Central Nepal, issued by him as n. 8121, or to that from Kamaon, issued by him as n. 8124. One specimen of the gathering issued by Wallich as n. 8121 had, prior to the distribution of the Hon. E.I.C. Herbarium, been made by A. P. De Candolle the basis of *M. napaulensis*, DC., of which, therefore, n. 8121 is a co-type, though Wallich, in issuing the remaining specimens of that gathering, did not use this or any other specific name. The plant issued, also without a specific name, as Wallich n. 8124. was subsequently used by Dr. Hooker and Dr. Thomson as the basis, along with another Kamaon gathering, Wallich n. 8126 E. of *M. robusta*, Hook. f. & Thoms. There was not an interval of two years, as suggested in the *Pflanzenreich*, between the issue of Wallich n. 8124 and Wallich n. 8126 E, which last in the *Pflanzenreich* has inadvertently been cited as n. 8127 E. In 1855, when *M. robusta* was first described, Hooker and Thomson did not deal with Wallich n. 8121, on which *M. napaulensis* DC. had been based before that distribution number had been applied to this particular gathering. In 1872 these authors included the Nepalese n. 8121 in their *M. robusta*, but omitted n. 8126 E. The fact that the Nepalese plant collected at Gossain Than in August, 1821, which was distributed in 1830 as Wallich n. 8121, was that on which De Candolle had based his species *M. napaulensis* in 1824, did not become known until 1895, so that Hooker and Thomson were not in a position to replace the name *M. robusta*, published by them in 1855, by the name *M. napaulensis* which had been applied to the Nepalese plant in question in 1824.

There is a slight discrepancy, therefore, between the statement made in the text of the *Pflanzenreich* that *M. robusta*, as defined by Hooker and Thomson, must be accepted in a sense which excludes this Nepalese plant, and the more important statement in the second footnote on the same page, that Wallich n. 8121, which is the Nepalese plant in question, is identical with the Kamaon plant, Wallich n. 8124, which is the type of *M. robusta*. This acceptance of the view taken by Hooker and Thomson in 1872, in preference to the earlier treatment by the same authors, involves two consequences. The geographical area of the species should include Nepal, since Wallich n. 8121

was collected in that country; the name of the species which includes Wallich n. 8121 should be the name applied to a plant of that gathering in 1824 rather than the name first given to it in 1872, more especially since that latter name was not applied to any *Meconopsis* until 1855. The circumstance that the Petrograd herbarium includes a specimen issued by Wallich as n. 8121 which cannot be distinguished from specimens of Wallich n. 8124 does not affect the relationship which the examples of these two gatherings in the Wallichian Herbarium itself bear to each other. This relationship may be most readily realised from the photograph of these which accompanies this paper, and an examination of that photograph may enable students of this genus to decide whether *M. napaulensis* and *M. robusta* be conspecific or not.

There are certain difficulties connected with the identification of Wallich n. 8121 and Wallich n. 8124. In the former, when in flower, the leaves, besides being beset with long barbellate setae, have, at least on the upper surface, a fine pubescence as well. In the fruiting specimens this fine pubescence has disappeared from the leaves, but the barbellate setae still persist. In the latter, when in flower, the leaves have the same covering of long barbellate hairs, but have no fine pubescence in addition; in fruit the barbellate setae almost entirely disappear, and the leaves are very nearly glabrous. The difference between the two is greater as regards the capsule, which in Wallich n. 8121 has 5 or casually 6 valves, but in Wallich n. 8124 has 7, or more often 8 valves. In both plants the ovary is at first adpressed-setose, but the setae of the fully developed capsule in the former become rigidly patent and persist—even in the oldest capsules seen the bases of the setae remain and stand out at right angles to the surface of the valves; in the latter most of the setae disappear from the ripe capsule, and the few that persist remain adpressed to the surface of the valves. The style in the Nepalese plant, n. 8121, is longer and more slender than in the Kamaon plant, n. 8124, and in this respect, as well as in the smaller number of valves beset with persistent patently-spreading setae, the ripe capsules of Wallich n. 8121 from Central Nepal differ from those of the yellow-flowered *M. robusta* from Kamaon to which Wallich n. 8124 belongs, and agree with those of the red-flowered *M. Wallichii* var. *fusco-purpurea* from Eastern Nepal and Sikkim. As there is no species of *Meconopsis* so far known in which the petals are sometimes yellow and sometimes red, it follows that if we could ascertain the colour of the petals in the species described by De Candolle in 1824 as *M. napaulensis* and distributed by Wallich in 1830 as his n. 8121, we should be in a position to pronounce a final verdict on the question as to whether the view with regard to this plant, taken, as an afterthought, by Hooker and Thomson in 1872 and more authoritatively reaffirmed in the *Pflanzenreich* in 1909, be tenable.

Unfortunately we have no direct statement on this point, and have to content ourselves with circumstantial evidence. We know that in August, 1821, Wallich obtained three species of *Meconopsis* from the mountain of Gossain Than in the north of

Central Nepal. We know that in 1830 Wallich distributed these three species as his nn. 8121, 8123b and 8125, respectively. The third species is a scapigerous plant which was described by D. Don in 1825 as *Papaver simplicifolium*, and again by G. Don in 1831 as *Stylophorum simplicifolium*, and was transferred by Walpers in 1842 to *Meconopsis* as *M. simplicifolia*. Wallich in 1830 had already placed it in its true genus, but had cited it under a different specific name, proposed but not published by himself in 1821. This species, not having a tall branching stem, only interests us in our present enquiry owing to the fact that the sheet of n. 8125 in the Wallichian type herbarium bears an original label with the legend "Polychaetia scapigera, Wall. Gossain Than Augusto, 1821."

The species issued by Wallich in 1830 as n. 8123b is accompanied by a similar label written up by Wallich with the legend "Polychaetia paniculata, Wall. Argemone et Papav. prox. Goss. Than Augusto, 1821." The species thus indicated is the one with tall branching stems and yellow flowers described by D. Don in 1825 as *Papaver paniculatum*. On the other hand, the species issued by Wallich in 1830 as n. 8121 under the Catalogue entry "Meconopsis e Gossain Than" has no original label corresponding to those which accompany n. 8123b and n. 8125. Like n. 8123b, n. 8121 is a species with tall branching stems.

The absence of a label dating from 1821 in the case of n. 8121 suggests that when the specimens were first brought to him, Wallich may have looked upon the two Nepalese mountain poppies with tall branching stems as forms of one species. There is a circumstance which, so far as it goes, is in keeping with this suggestion. Some time prior to 1824, Wallich sent from Calcutta to De Candolle in Geneva one specimen of a Nepalese *Meconopsis* with a tall branching stem, and at the same time sent to Lambert in London another specimen of a Nepalese *Meconopsis* with a tall branching stem. The specimen sent to Geneva was made the basis of *M. napaulensis*, DC., in 1824; that sent to London became the basis of *Paparer paniculatum*, D. Don. in 1825; moreover, Don took it for granted, at the time. that the two specimens in Geneva and in London represented the same plant. That De Candolle had received from Wallich a note not unlike the legend on the original label in Wallich's own herbarium is at least possible; the remark in the Prodromus "habitus fere Glaucii aut Argemones. An genus? an sectio propria" is not incompatible with this suggestion. We know, however, that the specimen which is the basis of *M. napaulensis*, DC., and of which through the courtesy of Mr. C. de Candolle we are able to publish a photograph. is part of the gathering issued by Wallich as his n. 8121, a photograph of which, as represented in Wallich's own herbarium, is also given here. We know, too, that the plant which was made the basis of *Paparer paniculatum*, D. Don, was part of the gathering which Wallich named *Polychaetia paniculata* in 1821, and issued as his n. 8123b in 1830. An examination of the photograph of the specimen of this gathering in the Wallichian herbarium will enable the difference between the plants described by De Candolle and Don respectively to be

readily appreciated, and explain how it came about that even if, in 1821, Wallich did suppose the two to be conspecific, he was induced, in 1830, to treat them as distinct.

We know that Wallich possessed more information concerning the gatherings of *Meconopsis* obtained by him in Nepal than the labels in his herbarium convey. We learn from D. Don* that Wallich supplied, with the specimens sent to Lambert, the Nepalese vernacular names of *M. simplicifolia* and *M. paniculata* and precise notes as to the colour of the petals of both of these species. In the case of *M. paniculata* this colour was given by D. Don in 1825 as yellow, and we know that this statement is correct. Yet in 1831 G. Don, when dealing with the same species†—we know that G. Don had his brother's specimens *and no others* in mind, because he speaks of the capsules as beset with *imbricate* bristles—described the flowers as either crimson or yellow, a statement which, as we have already seen, is contrary to our experience in any species of *Meconopsis*. Unless the statement were based on imagination—and this we have no right to assume—G. Don must have learned from some source other than his brother's work that there is in Nepal a *Meconopsis* with tall branching stems and red petals. The only possible source of such a statement was Wallich, who, at the time that Don's Dictionary appeared, was engaged in London in the distribution of the East India Company's collections. If the information as to there being a red-flowered *Meconopsis* in Nepal were correct, the statement could not apply to the tall species with branched stems, yellow petals, and adpressed-setose capsules, described by D. Don as *Papaver paniculatum*, and could only refer to the other tall species with branched stems and patently bristly capsules, described by De Candolle as *M. napaulensis*.

Having regard, however, to the uncertainty which has once more been created owing to the identification in the *Pflanzenreich* of the plant issued by Wallich as n. 8121, which is a co-type of *M. napaulensis*, DC., with the yellow-flowered species described by Hooker and Thomson as *M. robusta*, it seems advisable to await the receipt of further specimens of De Candolle's plant from its *locus classicus* in Central Nepal, and to obtain direct testimony as to the colour of its petals before definitely identifying it either with the yellow-flowered *M. robusta*, Hook. f. & Thoms., or with the red and blue-flowered *M. Wallichii*, Hook.

40. **Meconopsis napaulensis,** DC. Prodr. vol. i. p. 121 (1824); Prain in Journ. As. Soc. Beng., vol. lxiv. pars. 2, p. 317, quoad Wall. Cat. 8121 tantum (1896). *M. robusta*, Hook. f. & Thoms. Fl. Brit Ind. vol. i. p. 118 partim et quoad Wall. Cat. 8121 tantum (1872); Fedde, l.c., p. 269, partim et quoad Wall. Cat. 8121 tantum (1909). *Stylophorum nepalense*, Spreng. Syst., vol. iv. cur. post. p. 203 (1827); Steud. Nomencl., ed. 2, vol. ii. p. 650, partim (1841). *S. paniculatum*, G. Don. Gen.

* Prodromus Florae Nepalensis, p. 197.
† General System of Gardening, vol. i. p. 135.

Syst. vol. i. p. 135 (1831), partim et quoad exempla floribus rubris prolata.

HIMALAYA: Central Nepal; Gossian Than, *Wallich* 8121.

The specimens of the gathering upon one of which *M. napaulensis* was based have leaves which agree in shape both with those of *M. robusta*, Hook. f. & Thoms., and with those of *M. Wallichii*, Hook. As regards their indumentum the specimens of *M. napaulensis* are almost exactly intermediate between those of *M. robusta* and *M. Wallichii*. The capsules of *M. napaulensis* approach much more closely to those of *M. Wallichii* than they do to those of *M. robusta*, to which latter species Wallich n. 8121 has been referred both in the *Flora of British India* and in the *Pflanzenreich*. There is reason to think that *M. napaulensis* may have red flowers, but owing to the fact that the evidence as to this is circumstantial and inferential, it seems desirable, until direct testimony as to the colour of its petals becomes available, to treat Wallich n. 1821 as a *tertium quid*, and to delay the acceptance of the consequences of the action taken by Hooker and Thomson in 1872, and endorsed by Fedde in 1909, in so far as regards the reduction of *M. robusta* to *M. napaulensis*.

It has to be remembered by those who use the *Pflanzenreich* not only that the plant on which the species *M. napaulensis*, DC. was based has in that work been transferred to *M. robusta*, Hook. f. & Thoms., but that elsewhere in the same volume *M. napaulensis*, DC., inadvertently written *nepalensis*, has been tentatively referred to another genus.* *M. napaulensis*, Walp., which is not the same as *M. napaulensis*, DC., has in one passage in the *Pflanzenreich* been left as a synonym of *M. paniculata*, but has been cited afresh under *M. napaulensis*. DC., on the ground, explained in the second footnote on p. 269, that Walpers has not given a description of the species intended by him. This is the case, but the absence of a description by Walpers is due to the fact that no description was required. In 1825 Mr. D. Don, dealing with specimens of a *Meconopsis* from Nepal, sent by Dr. Wallich to Mr. A. B. Lambert, under the manuscript name *Polychaetia paniculata*, Wall., published a description of the species, which he referred to *Papaver* as *P. paniculatum*, at the same time imagining it to be the same thing as the plant published by De Candolle a year earlier under the name *Meconopsis napaulensis*. Dealing with the same problem in 1842, Walpers, who held the view that *Meconopsis* is a valid genus, accepted Don's description of the species as adequate, using as its name the synonym cited by Don and relegating the name used by Don to the position of a synonym.

41. **Meconopsis Wallichii,** Hook.: Journ. Hort. ser. 3, vol. xxxvii. p. 73, fig. 14 (1898); Fedde, l.c., p. 269. fig. 35 B (1909); Mottet in Rev. Hort. 1912, p. 204. figs. 63, 64 et icon. col.; Gard. Chron., 1912, vol. lii. p. 138 et 1913, vol. liii., fig. 66; Garden, 1915, p. 175 cum icon.

---

* Das Pflanzenreich. 40 Heft [IV. 104], p. 211.

Var. **typica**; flores coerulei.

Himalaya: Sikkim; Tongloo, 10,000 ft., *Hooker* 42; *Kurz* 363; *Clarke* 27522: Phullaloong, 10,000 ft., *Clarke* 13,460. Chumbi; Sham-chen, *King's Collectors*. Bhutan; Dichu Valley, *Cummins*.

Indo-China: Upper Burma; without precise locality, *Ward* 1907.

Western China: Western Szechuan; 12,000 ft., *Wilson* 3165.

This is the familiar Blue Poppy of Sikkim, the occurrence of which in China was reported by Wilson in 1904 (*Wilson* n. 3165). More recently it has been met with in Upper Burma by Ward, whose specimens were collected in 1914 (*Ward* n. 1907). The experience of the past ten years has definitely shown that it is not possible to treat this plant as specifically distinct from the red-flowered plant described and figured by Sir J. D. Hooker in 1884 as *M. Wallichii*, var. *fusco-purpurea*, Hook. f.,* which in 1896, and again in 1906, was identified by the writer with *M. napaulensis*, DC.; the two forms have been found to originate from seed ripened on the same plant, and occasionally both red or purple flowers and blue flowers may occur on the same individual. At the same time the reduction of *M. Wallichii*, Hook., to *M. napaulensis*, DC., is still undesirable, owing to the re-acceptance in the *Pflanzenreich* of the view taken in 1872 in the *Flora of British India* with regard to the identity of Wallich n. 8121, which is a co-type of *M. napaulensis*, DC. In transferring the plant which actually is *M. napaulensis*, DC., to *M. robusta*, Hook. f. & Thoms., the *Pflanzenreich* has nevertheless retained the name *M. napaulensis* to designate *M. Wallichii*, var. *fusco-purpurea*, Hook. f. This usage cannot be adopted owing to the fact that the plant which forms the basis of *M. napaulensis* has been transferred by Dr. Fedde to another species, but, the action having been taken, it seem preferable for the present to maintain Hooker's variety, and thus to avoid further confusion in the synonymy of this red-flowered form.

Var. **fusco-purpurea,** Hook. f. Bot. Mag. t. 6760 (1884); flores rubro-fusci vel fusco-purpurei.—*M. napaulensis*, Prain in Journ. As. Soc. Beng., vol. lxiv. pars. 2, p. 317 (1896), et in Ann. Bot. vol. xx. p. 359 (1906), quoad syn. Hook f. tantum; Fedde, l.c., p. 269, fig. 35 A (capsula juvenilis) 1909; Mottet in Rev. Hort. 1912, p. 204; Smith in Rec. Bot. Surv. India, vol. iv. p. 348 (1913).

Himalaya: Eastern Nepal; Thari, *King's Collectors*. Western Sikkim; Jongri, Tiamphung, *King's Collectors*; Eastern Sikkim; Chakung Chu, 11,000-12,000 ft., *Smith* 3962; *Ribu* 4465.

Western China: Western Szechuan; south-east of Mupine, 11,000–13,000 ft., *Wilson* 1152.

Since 1906 it has been found that this variety occurs in Eastern Sikkim as well as in Eastern Nepal and in the Western Sikkim

* Erroneously cited by the writer as *rubro-fusca* in 1896 and again in 1906. This error has been corrected in the *Pflanzenreich*.

1. M. NAPAULENSIS; co-type. 2. M. ROBUSTA; type.

[*To face page* 176.

1. M. PANICULATA; co-type. 2. M. NAPAULENSIS; type.

To face page 177.]

district of Jongri. More interesting still is the proof of its presence in China. This we owe to Mr. E. H. Wilson, who, during his journey of 1908, found in Western Szechuan the red-flowered form of the Sikkim Blue Poppy of gardens; the ordinary blue-flowered form he had already met with in the same province in 1904.

11. CHELIDONIFOLIAE, Prain, l.c., p. 364; Fedde, l.c., p. 270 (sect.).

42. **Meconopsis chelidonifolia,** Bur. et Franch.: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 270, fig. 34 c (1909); Wilson, Western China, vol. i. pp. 127, 248 (1913); Journ. Hortic. 1913, vol. lxvi. p. 149; Ball in Gard. Chron. 1914, vol. lv. p. 248.

This species has been introduced into European gardens through the Royal Botanic Garden, Glasnevin; it is perennial.

43. **Meconopsis *Oliveriana,*** *Franch. et Prain: Fedde, l.c., p. 270 (1909).*

This species has not yet been introduced to cultivation.

D. PRAIN.

EXPLANATION OF PLATES.

I.

Fig. 1. *Photograph of specimen in Wallichian type herbarium, issued by* Wallich in 1830 as n. 8121 "Meconopsis e Gossain Than." This specimen belongs to the same gathering as the original specimen of *Meconopsis napaulensis,* DC., published in 1824.

Fig. 2. Photograph of specimen in Wallichian type herbarium, issued by Wallich in 1830 as n. 8124 "Meconopsis Kamaon." This speci- is one of the types of *Meconopsis robusta, Hook. f. & Thoms., published in 1855.*

II.

Fig. 1. Photograph of specimen in Wallichian type herbarium, issued by Wallich in 1830 as n. 8123 "Meconopsis B Napalia." This belongs to the same gathering as the original specimen of *Papaver paniculatum,* D. Don [Meconopsis napaulensis, *Walp. non DC.:* M. paniculata, *Prain*], *published in* 1825.

Fig. 2. *Photograph of specimen in the Prodromus herbarium, sent by* Wallich to De Candolle, which is the type of *Meconopsis napaulensis,* DC., published in 1824.

XVIII.—CORNUS NUTTALLII AND ITS ALLIES.

W. J. BEAN.

(With Plates.)

There is a well-marked section of *Cornus* distinguished by its flowers being closely packed in a head, or capitulum, subtended by a showy involucre of four or more bracts. Four species belonging to this group are in cultivation:—*C. Nuttallii, C. florida, C. Kousa* and *C. capitata:* an excellent photograph of *C. Nuttallii* in full flower, lately received at Kew, is now reproduced. This, and the fact that several plants of the same species present in the collection at Kew have in recent years grown and flowered well, afford the opportunity for a few notes on this-

beautiful group of cornels. It may be mentioned that these four species are divisible into two sections, geographically, and by the character of their fruits:—

1. Fruits densely packed in a capitulum, but free; *C. Nuttallii*, *C. florida*. (Subgenus *Benthamidia*, Spach.) North America.

2. Fruits agglomerated into a fleshy mass; *C. Kousa*, *C. capitata*. (Subgenus *Benthamia*, Lindley.) Asia.

Cornus Nuttallii, *Audubon;* Bot. Mag. t. 8311—The illustration we give of this, the noblest of cornels, enables us to appreciate the enthusiastic terms in which this tree is invariably commented on by writers and by travellers in Western North America. We are told that its beauty, both at the flowering season and in autumn when the foliage turns bright orange and scarlet, is so impressive that the tree is spared "even by the settlers." The tree illustrated is by no means of exceptional size. Sargent gives the height as 40 to 60, occasionally 100, feet. Under cultivation in this country it is much more promising than its fellow American species—*C. florida*. At Kew some plants 6 to 10 feet high have flowered well for two or three years past. The inflorescence is formed in early autumn and remains exposed throughout the winter, the bracts developing and the flowers expanding the following May. The bracts usually number six, but vary from four to eight; they are 3 inches long and up to $2\frac{1}{2}$ inches wide, often partially overlapping. The whole involucre (or "flower" as it is popularly termed) is thus 6 inches wide and creamy white often tinged with pink later. The true flowers are small, greenish, and gathered in a dense head $\frac{3}{4}$ inch wide. The species is native of the coast region, from British Columbia and Vancouver Island to South California. We are indebted to Mr. F. W. Godsal, of Cowley, Alberta, Canada, for the photograph of a tree of *Cornus Nuttallii* growing in British Columbia which is here reproduced.

Cornus florida, *L.*; Bot. Mag. tt. 526, 8315 (*Benthamidia florida*, Spach.)—This beautiful small tree or shrub was in cultivation in the nursery of Thos. Fairchild, at Hoxton, as long ago as 1730, yet it has never become common in our gardens. Like so many other trees from Eastern North America, it finds something uncongenial in our climate—probably lack of sufficient sunshine in summer and autumn to ripen its wood thoroughly, together with late spring frosts that injure its young growths. It is perfectly capable of withstanding the severest winter cold we experience, as is shown by the healthy trees growing in the suburbs of Boston, Mass. It blossoms in May, the true flowers being inconspicuous and crowded in a head $\frac{1}{2}$ inch wide. The beauty of the inflorescence lies in an involucre of four bracts, each bract being obcordate, $1\frac{1}{4}$ to 2 inches long, 1 inch wide, white in the type, rosy red in var. *rubra* (Bot. Mag. t. 8315). The late Mr. B. E. C. Chambers was one of the most successful cultivators of *Cornus florida* and its variety in his garden at Haslemere, which, being elevated some hundreds of feet above sea-level and

Cornus Nuttallii.

[*To face page* 178.

CORNUS KOUSA.

surrounded by valleys, escapes many of the late spring frosts from which low-lying localities suffer.

Cornus Kousa, *Buerger* (*Benthamia japonica*, Sieb. & Zucc.; *Cornus japonica*, Koehne).—For many years before the dispersion of the collections of trees and shrubs in Messrs. Veitch's nursery at Coombe Wood, a fine example of this Japanese cornel used to flower there charmingly in May and June. Our figure is of a spray cut from this tree. The bracts, four in number, are distinct from those of *C. florida* and *C. Nuttallii* in their ovate-lanceolate outline and long acuminate points; they are creamy white, 1 to 1½ inches long, ½ to ¾ inch wide. As pointed out above, it differs from the two American species in its coalesced fruits which, in the aggregate, form a fleshy, strawberry-like mass. Introduced to cultivation originally from Japan, it is a native also of Corea and Central China. It reaches 20 feet or more in height.

Cornus capitata, *Wallich* (*Benthamia fragifera*, Lindl.; Bot. Mag. t. 4641).—At Kew this species can only be kept alive for any length of time by growing it against a wall, and even there it has rarely flowered. There are some very fine examples in Cornwall and in the South of Ireland. The tree was originally introduced from the Himalaya in 1825, and appears first to have been planted in the garden at Heligan, Cornwall. Some eight years later a plant flowered at Carclew, and upon it was founded the genus *Benthamia* by Lindley—after George Bentham, then secretary of the Royal Horticultural Society. Recent botanical opinion has put it back under *Cornus*, where it was originally placed by Wallich. Trees at Heligan are now over 40 feet high, also in Lord Barrymore's garden at Fota, near Cork, and probably elsewhere. They form a short thick trunk, the head of branches much wider than it is high. The bracts subtending each head of flowers are four to six in number and expand in July; they are of a beautiful pale yellow, obovate and 1½ to 2 inches long. Later, the fruits amalgamate into a fleshy, strawberry-like mass 1 to 1½ inches wide, and crimson, giving the trees a second season of beauty—often curtailed, however, by birds, which are fond of the fruits. Mr. Forrest has lately found *Cornus capitata* in S.W. China.

XIX.—THE USES OF CORNUS WOOD.

W. Dallimore.

Although the importance of *Cornus* wood is not sufficient to exert a noticeable influence upon the timber market, that of several species is in regular demand, and the following notes indicate some of its uses.

The branches of most of the species, whether of shrubby or tree-like habit, are tough, and, when split longitudinally, they are used for hoops of barrels, but it is the species that form

distinct trunks that have the greatest economic value, and it is to them that these notes are specially directed.

C. florida, L.

The wood is heavy, hard, and close-grained, usually yellowish in colour when young but brown from old trees. It bears a resemblance to boxwood, and is sometimes used for wood-engraving. Its chief use, however, is for turnery, and it is employed for shuttles, spindles, cotton reels, tool handles, cogs of wheels. hubs of wheels, etc., whilst it also provides very good charcoal. It is imported into this country cut into blocks ready for shuttles and spindles, the ends of the blocks being covered with wax to prevent shakes or checks.

C. Kousa, Buerg.

Little is known of the timber value of this species, although the wood is not unlike that of *C. florida*. It is a native of Central China and Japan, where it is found as a small tree with a decided trunk. The wood could probably be used for turnery.

C. macrophylla, Wall.

This tree inhabits the forests of the Himalaya, China, Corea and Japan, and is frequently found from 40–60 ft. high with a trunk upwards of 12 in. in diameter. The wood has been used for cabinet work and turnery, and Gamble in "A Manual of India Timbers," p. 390, says that it "gives good gunpowder charcoal."

C. Mas, L.—Cornelian Cherry, Cornel.

Throughout the greater part of Europe and in certain parts of Western Asia this species is found wild, its place being taken in Eastern Asia by *C. officinalis*, Sieb. & Zucc., the two species being more distinct geographically than botanically. Under normal conditions they form small trees or large bushes 15–25 ft. high with trunks or main branches 6–9 ins. in diameter. The wood is used in Europe for hayforks, walking sticks, staves for ladders, tool handles (more particularly for picks and hammers), vine stakes, butchers' skewers, fuel and gunpowder charcoal. The young branches are very tough and are sometimes used for binding purposes in the same way as willow rods. As the wood is hard and close-grained it could be used for turnery; moreover, it takes a very good polish. The wood is pale yellow when young, the heart-wood of old plants being brown. A dye obtained from the wood was at one time used by the Turks for dyeing their fezes.

C. Nuttallii, Audub.

The wood is hard, strong, and fine-grained, the sap-wood creamy-white and the heart-wood brown. It is used for turnery, tool handles, mallets, cabinet-making, metal spinners' forms and for other purposes. A section in Museum No. 1, at Kew, is prettily marked.

C. sanguinea, L.—Dogwood, Hounds'-tree, Prickwood.

This is the common dogwood of Europe and N. and W. Asia. It is found wild in the British Isles, and usually grows in bush

form from 6–18 ft. high. The branches are sometimes 6–9 in. in diameter, and the close-grained yellowish wood bears a striking resemblance to boxwood. The wood is not in regular use, although it has been employed for gunpowder charcoal, either pure or mixed with wood of *Rhamnus Frangula*. It is also used for cogwheels, walking sticks, butchers' skewers, and toothpicks. From the two latter uses the common name of prickwood originated. The common names of hounds'-tree and dogwood are said to have occurred by reason of a decoction of the bark being used for washing mangy dogs. It appears probable that both this species and *C. Mas* might be profitably employed under coppice conditions for walking sticks and gunpowder charcoal.

XX.—MISCELLANEOUS NOTES.

We learn that Mr. S. C. Harland, B.Sc., has been appointed Assistant Agricultural Superintendent, St. Vincent, in succession to Mr. F. Birkinshaw, transferred to Mauritius (*K. B.*, 1914, p. 227).

Dr. R. E. Fries and the Bergielund Botanic Garden.—The recent announcement of the appointment of Dr. Klas Robert Elias Fries as Director and Professor at the Bergielund Garden demands notice. He is a son of Prof. Thore Magnus Fries (1832–1913), who was Professor of Botany in the Royal University of Uppsala from 1877 to 1900, and grandson of Elias Magnus Fries (1794–1878), the brilliant expositor of the Fungi, termed by Sir Joseph Hooker, the "Father of Mycology."

He has travelled in South America and published extensively on his collections, chiefly from the Argentine, and has worked out many of Regnell's plants. Since 1905 he has been *Docens* (Lecturer) in Botany in his University.

Bergielund, a name bestowed by its founder, otherwise known as Hortus Bergianus, and in Swedish as Bergiansk Botaniska Trädgården, is situated at Albano, a short distance to the north-west of Stockholm. It was bequeathed to the Royal Academy of Science by Peter Jonas Bergius (pron. Bāre-yūs), who died in 1790, aged 60. He had been a pupil of Linnaeus, and was author of "Descriptiones plantarum ex Capite Bonae Spei," 1767. The bequest took effect in 1791, and the Academy became possessed of a garden devoted in perpetuity to horticulture and botany, of about 17 acres in extent, together with a library of 5,000 volumes, an herbarium of 9,000 species in 15,632 sheets, and the largest part of the testator's estate.

The Academy appointed Olof Swartz (1760-1818) as the first Professor and Director; on his death he was succeeded by J. E. Wikström (1789–1856), in turn followed by Nils Johan Andersson (1821–1880). The last-named retired from ill-health in 1879, and was succeeded by Veit Brecher Wittrock, whose labours and success in establishing the "Acta horti Bergiani" are widely known and appreciated. His recent death is much deplored.

An interesting incident connected with this establishment was the gift in 1808 of £250 by Sir Joseph Banks, Bt., P.R.S., the income to increase the professorial stipend, but with the proviso that the annual return should be enjoyed during life by Fru A. M. Idman, a relative (married sister?) of Daniel Solander, Banks's fellow-traveller and afterwards his librarian.

The lady died in the same year, 1808, so the increment came at once to augment Swartz's modest salary.

B. D. J.

Trees and Shrubs Hardy in the British Isles.*—The need of a comprehensive descriptive work upon hardy trees and shrubs has long been felt, for although certain groups have been dealt with fairly completely from time to time, there has been nothing to take the place of Loudon's great work published between 70 and 80 years ago and now hopelessly out of date. The book under notice, however, fills the want, and is likely to remain the standard work upon hardy woody plants for many years to come.

The new book is by Mr. W. J. Bean, the Assistant Curator of the Royal Botanic Gardens, Kew, whose long connection with the Kew collections and complete knowledge of everything connected with arboriculture have peculiarly fitted him for the work. The late Mr. G. Nicholson contemplated a revision of Loudon's book had not failing health put a stop to all serious work, and in some quarters an idea has prevailed that Mr. Bean's book was being prepared upon similar lines. But a comparison of the two books shows that there is nothing in common between them except the thoroughness of the authors.

The work is divided into two volumes, the first containing 688 pages and the second 736 pages. The first volume commences with chapters upon various operations connected with the culture of trees and shrubs and lists of subjects suitable for various soils and positions, and concludes at page 110 with a glossary of botanical terms. In this part are found chapters upon such subjects as propagation, hybridising and selection, nursery work and methods, transplanting, soils and mulching, arrangement of shrubberies, staking or other means of support, pruning trees and shrubs, climbing shrubs, pendulous trees, fastigiate or erect-branched trees, dwarf trees and shrubs, trees and shrubs with handsome fruits, handsome-barked trees and shrubs, variegated and coloured trees and shrubs, fine-foliaged trees and shrubs, autumnal colour in trees and shrubs, early- and late-flowering trees and shrubs, street planting, hedges, trees and shrubs for wet places, shrubs for dry positions and poor soils, shrubs in shady places, seaside planting, and an excellent and exceedingly interesting opening chapter entitled historical notes. From page 111 of the first volume to the end of the second volume the space is given over to a descriptive list of genera and species, except for some 40 pages at the end, which are required for an index.

---

* "Trees and Shrubs Hardy in the British Isles." By W. J. Bean, Assistant Curator, Royal Botanic Gardens, Kew. London: John Murray; 2 vols., price 42s. net.

The genera are arranged alphabetically, and a systematic method of description obtains throughout. In the first place, a general description of the genus is given, followed by descriptions of the important species with any special cultural remarks that may be necessary. The following description of *Betula lenta* is typical of the descriptions of species throughout the work, except that whenever possible a reference is given to a figure of the plant, and important synonymous names are inserted when such exist and are likely to cause confusion.

"B. LENTA, *Linnaeus*. BLACK OR CHERRY BIRCH.

A tree up to 70 or 80 ft. high in a wild state; the bark of the trunk not peeling, dark, almost black; young shoots silky-hairy when very young, soon becoming smooth and shiny brown. Leaves ovate or ovate-oblong, mostly heart-shaped at the base, pointed, $2\frac{1}{2}$ to 6 ins. long, $1\frac{1}{2}$ to $3\frac{1}{2}$ ins. wide, toothed (often doubly so), dark glossy green and ultimately smooth above, paler green and silky-hairy on the mid-rib and veins beneath; veins in ten to thirteen pairs; leaf-stalk $\frac{1}{4}$ to 1 in. long, hairy. Male catkins 2 to 3 ins. long. Fruiting catkins 1 in. or rather more long, $\frac{1}{2}$ in. in diameter, scarcely stalked; scales not downy, the lateral lobes rather wider than the middle one.

Native of Eastern N. America, where it yields a valuable timber; introduced in 1759, according to Aiton. When bruised, the young bark has a sweet, aromatic taste and smell, and by distillation yields an aromatic oil. This birch is allied to B. lutea, but differs in the darker bark of the trunk, the sweeter-tasted young bark, and especially by the smooth scales of the fruit catkin. In my experience it is not so well-doing a tree as B. lutea in this country."

From such a description a person who is quite ignorant regarding the species can form a good idea of its general character and peculiarities, whilst the technical terms used are such as can be readily understood.

In addition to descriptions of the older trees and shrubs being given, attention has been paid to new introductions, and a large number of plants introduced to European gardens within the last 15 years are well described.

The work is well illustrated by full-page photographs by Mr. E. J. Wallis and by line drawings, made from photographs, by Miss E. Goldring. The publisher is Mr. J. Murray, and both author and publisher are to be congratulated upon the production of such a valuable and long desired book.

---

* **Wild Rubber and Selection.**—Dr. Cramer of Buitenzorg, in a paper under this title, gives some useful hints to growers on the selection of *Hevea*. This subject, he points out, has been neglected, or at any rate undertaken on wrong lines. The selection of *Hevea* should commence with the seed-bearers, and not be entirely confined to the seeds or the seedlings. According to the author's personal observations of both wild and cultivated

---

* Dr. P. J. S. Cramer in International Rubber-Congres Met Tentoonstelling, Batavia, 1914—Rubber recueil.

trees, considerable variation occurs in the shape and size of the seeds from different examples, and also in the productiveness of wild trees, among which "barren" individuals are sometimes found. Dr. Cramer gives reproductions of photographs of a series of seeds from trees of *H. brasiliensis* growing in the same localities in Brazil, which show striking variation in size. The impossibility of determining critical species from seeds alone is evident from the author's remark that "the difference in [seed] characters in *Hevea Randiana* (a closely allied species) and *H. brasiliensis* is less marked than may occur between the seeds of two trees of true *brasiliensis*."

The wild trees observed by Dr. Cramer were all from the lower reaches of Brazilian rivers, which often overflow their banks at high tide, and he suggests an interesting explanation of the cause of marked differences which are shown in adjacent trees in such localities. Frequently seeds may be observed floating down the rivers from the upper reaches, and these become stranded in quiet corners of the banks, where they form a layer on the water. At high tide they are immediately transferred to a considerable distance on the adjoining banks, where they germinate. Therefore many of the trees now growing in the lower reaches of Brazilian rivers are really the direct offspring of upper region types, and thus a mixture of the two races has been brought about.

Part 5 of the paper deals with experiments on seedlings and tables and photographs are given showing their relative variation from different stocks.

In part 6, Dr. Cramer points out that, according to the late Dr. Huber, the Tapajoz region of Brazil where Wickham obtained his seeds, is not the place from which the best rubber is at present obtained, and as nearly the whole of the East India plantations have been stocked from seeds gathered in this region, it is therefore assumed that the quality of the rubber is not so good as it might have been had the first seeds been gathered in the Acré district of the up-river regions, *i.e.*, on the Beni and other tributaries of the Upper Madeira and Purús rivers, where the best rubber is at present obtained. There is, however, no indication that this rubber is superior to that which used formerly to be collected in the Tapajoz region.

The question is discussed as to whether this Acré or up-river *Hevea* may be a distinct variety or subspecies of *H. brasiliensis*, as is the general belief in Brazil, and Dr. Cramer is himself inclined to this opinion.

It should be noted that Dr. Cramer's work on *Hevea* selection so far concerns the character of the seedlings only, and it remains to be seen whether the young plants showing the most vigorous growth will prove to give the greatest yield of latex.

Dr. Cramer's interesting contribution concludes with notes on the practical importance of careful choice of the best producing varieties of other agricultural crops, citing as examples the advantages which have accrued from the introduction of *Cinchona Ledgeriana*, with a bark richer in quinine than the older *C. officinalis*, the replacement by Assam instead of the old China tea, and the revival of the coffee cultivation in Java by the advent of *Coffea robusta*.

J. H.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 5] [1915

XXI.—SANSEVIERIA.

A MONOGRAPH OF ALL THE KNOWN SPECIES.

N. E. BROWN.

(With Plates.)

In the *Kew Bulletin* for May, 1887, an account was published of all the species of *Sansevieria* then cultivated at Kew, together with notes concerning the quality and value of their fibres. Since that date the number of species has been greatly added to, and at present the collection of species of this genus in cultivation at Kew is undoubtedly the largest that has ever been got together. In 1898 there were 12 species known from Tropical Africa, 3 species from South Africa and 3 from India, making 18 in all. In 1903, Gérôme and Labroy in Bull. Mus. D'Hist. Nat. p. 167 enumerate 20 species known to them. In the present account of the genus 54 species are described, besides some others that are only known from very imperfect descriptions, some of which may possibly be the same as species here described. Out of this number 43 are at present in cultivation at Kew, together with a few new species not yet in a condition for describing.

The genus *Sansevieria* was established by Thunberg in 1794 in his *Prodromus Flora Capensis*, Nov. Gen. Char. No. 29 and p. 65, where two species (*S. thyrsiflora* and *S. aethiopica*) are described. Seven years previously (in 1787), however, upon one of these same plants, Petagna, *Institutiones Botanicae*, vol. 3, p. 643, founded the genus *Sanseverinia*, and what is somewhat remarkable, gave it the same specific name (*S. thyrsiflora*) as Thunberg did under *Sansevieria*. Whether Thunberg had any knowledge that Petagna had already described the plant under the generic name of *Sanseverinia*, does not appear, but the similarity of both generic and specific names seems rather a suspicious circumstance, especially as Thunberg in 1818, in his *Flora Capensis*, vol. 2 p. 322, spells the name *Sanseverina*.

Petagna's name, however, is antedated by one year by the name *Acyntha*, which Medikus in 1786 (*Theodora*, p. 76) established upon the plant figured by Jacquin as *Aletris guineensis* in his *Hort. Vindob.* vol. 1, t. 84 (=*S. trifasciata*, Prain).

(3859.) Wt. 153-601. 1,125. 6/15. J. T. & S. G 14.

This again is antedated by 24 years by the name *Cordyline*, which Adanson (Fam. des Plantes, vol. 2, pp. 54 and 543) established in 1763 upon *S. lanuginosa*, Willd. and *S. zeylanica*, Willd. So that if priority of generic name is strictly adhered to, all the species here enumerated should be placed under the name *Cordyline*, concerning which and other matters relating to *Sansevieria*, see the *Kew Bulletin*, 1914, p. 273. But in deference to the ruling of the Botanical Congress at Vienna in 1905, the generic name *Sansevieria* is here maintained, as it has been in general use for over a century and any change now made would only result in very great inconvenience and confusion.

In Bentham and Hooker, *Genera Plantarum*, vol. 3, p. 679, this genus is placed by Bentham in the order *Haemodoraceae*. This removal of the genus from *Liliaceae*, where it was formerly placed, is most unaccountable and can only be understood upon the assumption that he entirely overlooked the very obvious affinity of *Sansevieria* to *Dracaena*, which is so pronounced that several species of *Dracaena* (one even in recent years) have been described as species of *Sansevieria*. Engler in his *Pflanzenfamilien*, vol. 2, part 5, p. 84, has rightly transferred *Sansevieria* together with *Ophiopogon*, *Liriope* and *Peliosanthes* to *Liliaceae*. but has separated *Sansevieria* from *Dracaena* by 26 other genera, so that the very close affinity of these two genera would appear to have been overlooked; a discussion of their relationship will be found in the *Kew Bulletin*, 1914, p. 273.

The genus *Sansevieria* is chiefly confined to Africa and the islands near its coast, and Arabia. Nearly all the species are congregated in the tropical area of the continent, as only 5, if my identification of *S. angustiflora* (p. 248) is correct, occur in South Africa, and none are found in the northern extratropical region. Only 4 species are definitely known to inhabit any other region, and these are natives of Ceylon, India, Burma, and perhaps China.

As is well known, many species of this genus are largely cultivated in various parts of the Tropics for their valuable fibre, which is of excellent quality in almost all, although varying with the species. Unfortunately it is impossible at present to give particulars concerning the quality and value of the fibre derived from the various species, for two reasons. In the first place, most of the fibres examined in our museums are labelled as being derived from *S. guineensis*, *S. sulcata*, and *S. zeylanica*. From the evidence accumulated during the progress of this work, I have every reason to believe that neither of these names belong to the fibres to which they are attached, unless it may be that some samples labelled *S. zeylanica* were actually obtained from the wild plant of Ceylon, since the Indian plant is distinct, and all living cultivated plants so named prove to belong to two or three other species, whilst at least four distinct species have been seen in the living state cultivated under the name *S. guineensis* and three under that of *S. sulcata*, neither of them correctly named. In the second place, the fibres are not accompanied by

leaves of the plants from which they were obtained, so that it is quite impossible to identify the fibre; and as the market value varies several pounds per ton in acordance with the quality, which differs with the species, this want of accurate knowledge of the species yielding any particular quality of fibre is to be regretted. Correct identification could only be made where the fibre is accompanied by an entire adult plant (with dried flowers if possible) of the particular species from which it is derived; juvenile plants are useless for purposes of identification.

As there is no existing account of the genus from which the very numerous species now known can be identified, this monograph has been specially prepared from living plants as far as possible, and, as it is primarily intended to be useful to those interested in Sansevierias from their commercial aspect and who have little or no knowledge of botany, the use of botanical terms has been avoided as far as possible, and the few that have been retained are in such general use that they can scarcely be misunderstood; their meanings, however, are as follows:—

Attenuate, gradually tapering.
Bract, a scale at the base of the stalk (pedicel) of each flower.
Coriaceous, leather-like in substance.
Filiform, thread-like, or very slender, and of equal thickness throughout.
Glaucous, covered with a whitish or greenish-white "bloom," like that on a grape.
Lanceolate, broadest at or near the middle and narrowed towards the apex and base.
Linear, very narrow, with nearly or quite parallel sides.
Linear-lanceolate, narrow, but with the middle part rather broader than above or below.
Panicle, a flower stem that is branched.
Pedicel, the stalk of each individual flower.
Petiole, the stalk of the leaf.
Petiolate, when the leaves have stalks.
Raceme, the flowering part of an unbranched flower-stem.
Sessile, without any stalk.
Subulate, awl-shaped or tapering like a spine.
Terete, circular in transverse section.

For many of the plants from which the descriptions have been made, Kew is indebted to Mr. M. T. Dawe, when Director of Agriculture, Beira, Portuguese East Africa; Prof. W. R. Dunstan. Director of the Imperial Institute; Major A. T. Gage, Superintendent of the Botanic Garden, Calcutta; Monsieur L. Gentil. Curator of the State Botanic Garden, Brussels; Mr. A. P. Grenfell, Farringdon Works, Shoe Lane, London; Monsieur E. Perrier, Director of the Jardin des Plantes, Paris; Mr. H. Powell, Chief of the Economic Plant Division, Nairobi, British East Africa; and Dr. J. Medley Wood, Director of the Natal Herbarium, Durban.

The illustrations have been prepared by Miss M. Smith from life-size drawings preserved in the Kew Herbarium.

Sansevieria, *Thunb.*

Stemless plants with a creeping rootstock or with a distinct stem and bushily branching at or near the base. The number of leaves produced by each growth is limited, according to the species. Leaves fleshy or fleshily coriaceous, flat, channelled, half-cylindric, cylindric or laterally compressed, rigid, firm or flexible, full of fibre. Flower-stem simple or branching, always terminating the growth producing it, usually with leaves or a leaf at its base, but sometimes with only a few scales or sheaths at the base, the growth producing it being leafless. Flowers solitary or two or more in a cluster, on pedicels that are jointed near the middle or apex, the upper part falling off with the flower (deciduous part), always with membranous or thin scale-like bracts at the base; each flower with a distinct tube and six narrow lobes that are usually rolled back or very spreading when fully expanded, remaining open only one day or night; often fragrant. Stamens six, much exserted from the tube of the flower, with slender filiform filaments. Ovary free, 3-celled, with 1 ovule in each cell; style slender, filiform, about as long as the stamens. Fruit a berry, containing 1–3 bony seeds.

The key to the species has been prepared chiefly from living plants cultivated at Kew, and will not be found to be always applicable to dried specimens, for, although every endeavour has been made to construct a key that would apply equally to living plants and dried specimens, after three attempts it has been found impossible to do so; because, in the first place, collectors rarely preserve more than a few loose leaves, or sometimes only part of a leaf, quite unattached to the rootstock; even then it is often only the smaller or outer leaves of a growth that are preserved, so that no knowledge can be obtained of the number of leaves to a growth, their arrangement nor the full size and characteristics of the inner leaves of adult flowering plants, all of which are important characters that have to be taken into consideration in the discrimination of the species. It is often utterly impossible to name a species from a single leaf, either living or dead; the whole plant is required. In the second place, I find that there are some species which can easily be distinguished at a glance when seen alive and growing side by side, yet when dried their leaves (for often flowers cannot be obtained) lose their most important distinctive characters, and the species cannot then be distinguished, or only with difficulty, such as by a microscopic examination of the epidermis and of very thin sections of the leaves. Where complete flowering specimens have been preserved the flowers usually show some specific difference, even where the leaves do not, when dried.

One of the most interesting characteristics of this genus is the very remarkable change which takes place in the form of the leaves of many of the species as the plant advances from the juvenile to the adult stage. When seeds of any of the species having cylindric leaves in the adult state are sown, the seedling plants invariably have moderately thin flattened or concave leaves also pass through the same stages, examples of which are

grows older these flat leaves are gradually succeeded by others that are thicker, less flat, more ascending, and finally by others of a more and more cylindric type until the adult erect cylindric type is produced. Young plants raised from cuttings of the leaves also pass through the same stages, examples of which are illustrated under 19, *S. Pearsonii*, and 21, *S. Stuckyi*. This change would seem to indicate that all the species having the cylindric type of leaf have originated from ancestral forms having flattened leaves. This variability in the form of the leaf, according to the age, of the plant, renders it impossible to name specimens that are not of adult age, therefore in the following key only characters taken from adult flowering plants have been taken into consideration.

The key is more diagnostic than is usually the case, because it has been found that one based upon a few briefly stated characters is absolutely useless for working purposes. Also, in the effort to make it as useful as possible, where a species is known to vary in the characters used, it has been inserted in more than one place in the key, in accordance with that variation. Attempts have been made by other authors to discriminate the species by sections of their leaves alone, but this has been found to be quite impracticable, since not only do different leaves on the same plant often vary very considerably, but even the same individual leaf will vary with age or the amount of shrivelling due to drought to which it has been exposed, causing the margins to infold or grooves to appear on the back or sides, which are quite absent when the plant is in vigorous growth. All the leaf sections given in the illustrations are of natural size, made from nature-printed ink impressions of healthy fresh leaves from adult plants, with the exception of those of 5, *S. suffruticosa*, 17, *S. rhodesiana*, and 29, *S. burmanica*, where sections of old or partly shrivelled leaves are also given to contrast with those of leaves in a vigorous state of health.

The measurements are in feet, inches and lines; one line equals one-twelfth of an inch.

N.B.—Detached leaves, living or dead, cannot be determined with this key, one or more entire growths of the adult plant are required.

I.—STEM, $1\frac{1}{2}$–5 FT., OR PERHAPS MORE, HIGH (UNKNOWN IN *S. bagamoyensis*), ERECT, BRANCHING AT OR NEAR THE BASE AND OFTEN ABOVE THE GROUND, LEAFY THROUGHOUT OR SCALY AT THE BASE.

Leaves of adult plants, 7–18 in long, flattish or concave (perhaps somewhat longitudinally folded in *S. bagamoyensis*), 1–2 lin. thick at the base:—	
Stem in the dried specimens seen less than $\frac{1}{2}$ in. thick; leaves less than $\frac{3}{4}$ in. broad	1. *bagamoyensis.*
Stem $\frac{2}{3}$–1 in. thick; leaves $\frac{3}{4}$–$1\frac{3}{4}$ ins. broad ...	2. *arborescens.*
Leaves of adult plants 1–$2\frac{3}{4}$ ft. long, $\frac{3}{4}$–$1\frac{1}{3}$ in. broad, concave or channelled down the face, 6–9 lin. thick near the base:—	
Leaves with a channel down the face as broad as the leaf, and tapering to a hard pale brown spine-like point; flower-stem branched	3. *Powellii.*

Leaves with a channel down their face much narrower than the leaf, except at the base, and tapering in a cylindric manner to a slender and very acute green or pale brown or whitish point, which at first is slightly horny but not very hard; flower-stem not branched ... ... 4. *caulescens.*

Leaves of adult plants 3–7 ft. long, laterally flattened, $1\frac{1}{4}$–$1\frac{3}{4}$ in. thick at the base, with a channel as broad as the leaf down the face; flower-stem branched ... ... 11. *robusta.*

II.—STEM EITHER NONE OR NOT RISING ERECTLY MORE THAN ABOUT 1 FT. ABOVE THE GROUND. THREE SPECIES PRODUCE AT 2–4 IN. ABOVE THE GROUND, ASCENDING OR TRAILING BRANCHES $\frac{1}{4}$–3 FT. LONG, WHICH ROOT AND BEAR A TUFT OF LEAVES AT THEIR ENDS, BUT EXCLUDING THEIR TRAILING LENGTH DO NOT RISE ERECTLY MORE THAN 1 FT. ABOVE THE GROUND. (See also 1, *S. bagamoyensis*, of which the height of the stem is unknown.)

A.—Leaves in transverse section at their middle about as thick as, or thicker, than they are broad, cylindric or more or less flattened at the sides, and with or without a channel all down the face above the sheathing part.

*Leaves of adult plants solitary, or occasionally 2 (very rarely 3) together (in seedling or juvenile plants there may be 4–5 in a tuft), scattered along an underground rootstock at distinct intervals or one close behind another, cylindric:—

Leaves of adult plants 4–9 ft. long (under cultivation, sometimes $1\frac{1}{2}$–3 ft. long), with a distinct narrow channel down the face:—

Adult leaves $1\frac{1}{2}$–$2\frac{1}{2}$ in. thick at the base, with a channel 3–16 lin. broad down the face, dark green or dull grass green, with rather paler transverse bands, which become indistinct on old leaves ... ... 21. *Stuckyi.*

Adult leaves $\frac{3}{4}$–$1\frac{3}{4}$ in. thick at the base, with a channel $1\frac{1}{2}$–3 lin. broad down the face, dull greyish or bluish-green, or of a brownish tint, rather indistinctly marked with paler transverse bands ... ... 22. *singularis.*

Leaves of adult plants $\frac{1}{2}$–$2\frac{1}{2}$ ft. long, 5–11 lin. (or in *S. sulcata* when alive perhaps more) thick; flowers in a simple spike-like raceme not half as long as the leaves:—

Leaves apparently with 8–9 slight grooves ... 23. *sulcata.*

Leaves usually with 5–6 (rarely more) distinct grooves ... ... 24. *canaliculata.*

**Leaves of adult plants 3–18 to a growth:—

†Leaves cylindric, not flattened at the sides (the outermost sometimes half-cylindric):—

‡Leaves without a channel down the face above the basal sheathing part, with hardened brown or whitish tips:—

Stems of adult plants rising erectly 3–12 in. above the ground and often branching in the air; branches $\frac{1}{4}$–3 ft. long, ascending when short or trailing over other branches when long, covered with scale-leaves and ending a tuft of foliage:—

Leaves distinctly rough to the touch, at least on the apical part, the hardened apex very acute and $1\frac{1}{2}$–2 lin. long ... ... 5. *suffruticosa.*

Leaves smooth, 5–12 to a growth:—
Leaves $\frac{1}{3}$–$1\frac{1}{2}$ ft. long, 6–9 lin. thick, rather suddenly acute or obtuse at the apex, dull bluish-green or dull dark green ... 6. *Phillipsiae.*
Leaves $\frac{3}{4}$–$2\frac{1}{2}$ ft. long, 3–$4\frac{1}{2}$ lin. thick, gradually becoming very acute at the apex, deep grass green ... ... 7. *gracilis.*
Stem of adult plants none or very short, never branching in the air. Leaves 3–6 to a growth, 2-ranked, 2–5 ft. long, $\frac{3}{4}$–$1\frac{1}{4}$ in. thick, not grooved:—
Leaves mostly stiffly erect and not very widely diverging, the longer or all gradually tapering to a very acute point 20. *cylindrica.*
Leaves all more or less irregularly recurving or widely spreading, rather shortly or abruptly pointed ... ... 20. *cylindrica var. patula.*

‡‡Leaves with a distinct channel all down the face, continuous with the sheath, besides and larger than any grooves that may be present, but in the central leaves of adult plants (except perhaps in *S. rorida* and *S. deserti*) always much narrower than the full breadth of the leaf at the middle part. Flower-stem branched in *S. rorida*, in all the others (where known) unbranched and the flower-clusters forming a spike-like raceme:—
Channel with acute whitish or green edges below, passing into obtusely rounded green edges at the upper part of the leaf; some leaves almost without a channel apart from the furrows; flowers mostly 3–6 in a cluster ... ... 16. *intermedia.*
Channel with acute edges from base to apex of the leaf:—
Central leaves of adult plants with green edges to the channel or with white or red-brown edges only at the basal or apical part of the leaf:—
Leaves 5–10 to a growth, widely spreading in a fan-like manner, the outer being horizontally recurved from the base; central leaves of adult plants $\frac{2}{3}$–$1\frac{2}{3}$ in. thick, somewhat abruptly narrowed into a short hard white point; flowers 2–3 in a cluster ... ... 15. *patens.*
Leaves 4–8 to a growth, erect, straight or slightly curved, $\frac{1}{2}$–1 in. thick, gradually tapering into the acute hard white point; flowers 4–10 in a cluster:—
Leaves with 9–12 shallow furrows on the sides and back; pedicels 3–$3\frac{1}{2}$ lin. long, jointed below the middle ... 13. *deserti.*
Leaves (except from age or when withered) without furrows; pedicels 2–$2\frac{1}{2}$ lin. long, jointed slightly above the middle ... ... 14. *varians.*
Central leaves of adult plants with reddish-brown or white edges to the channel nearly or quite up to the apex or at least extending beyond the middle (in 13, *S. deserti*, the length to which the red

edge extends is at present unknown), straight, with several longitudinal impressed lines or furrows, besides the channel down the face:—

Leaves very rough, almost like that of fine glass-paper, 2–3½ ft. long, ½–¾ in. thick near the base, dull dark bluish-green ... ... 18. *sordida.*

Leaves nearly smooth or only slightly rough, ¾–1½ in. thick near the base:—

Stem erect, up to 9 in. high; leaves spreading 1–1¾ ft. long; flower-stem branching ... ... 8. *rorida.*

Stem none; flower-stem not branched:—

Central or all the leaves of adult plants gradually but not widely diverging from base to apex, with the tips of the inner pair 6–12 in. apart, 2¼–3 ft. long, usually somewhat distinctly banded when young ... ... 19. *Pearsonii.*

Central or all the leaves of adult plants more or less parallel and scarcely or not at all wider apart at the tips than at the base, not or very indistinctly banded when young:—

Leaves 2½–3½ ft. long; channel at about 1 ft. above the base nearly as broad as the leaf, but much narrower than it above; flower with a tube 3½–4 lin. long, and lobes about 6 lin. long ... ... 13. *deserti.*

Leaves 3–5½ ft. long; channel at about 1 ft. above the base very much narrower than the breadth of the leaf; flower with a tube 4–6 lin. long, and lobes 7½–9 lin. long ... ... 17. *rhodesiana.*

††Leaves with flattened or flat sides and as thick as or thicker than they are broad; channel at about the middle of the leaf nearly or quite as broad as the leaf itself (this character is useless for dried or withered specimens, as the channel contracts in the process of drying and often appears much narrower than the leaf), with reddish-brown margins, usually edged with a white membrane; apex tipped with a hard, sharp point:—

Stem of adult plants 1 ft. or more high; leaves 6–14 to a growth; persistent part of the pedicels ½–¾ lin. long ... ... 11. *robusta.*

Stem of adult plants 0–9 in. high; leaves 5–9 to a growth; persistent part of the pedicels 1–1½ lin. long ... ... 12. *Ehrenbergii.*

B.—Leaves in transverse section at their middle 4 lin. or more thick from the bottom of the channel to the back, and only ⅓–⅔ as thick as they are broad (uncertain in 25, S. lanuginosa), with the channel down the face nearly or quite as broad as the leaf at that part, but in S. rorida much narrower at the upper part of the leaf. (Species No. 26, *S. Volkensii* belongs here, but the description is insufficient to place it properly.)

*Stem 4–8 in. high; flower-stem paniculately branched above. (See also 9, *S. zanzibarica*, of which the flowers are unknown):—

Leaves of adult plants 1–2 ft. long, broadly channelled and somewhat half-cylindric at the basal part, becoming cylindric and narrowly channelled towards the apex ... ... 8. *rorida.*

Leaves of adult plants 3–5 ft. long, with a deep concave channel as broad as the leaf throughout its length ... ... 10. *Perrotii.*

**Stem none (or 9 *S. zanzibarica* "scarcely caulescent"); leaves with a channel down the face as broad as the leaf and rounded or obtusely keeled on the back; flower-stem, where known, unbranched and the flower-clusters arranged in a spike-like raceme:—

Adult leaves with reddish-brown edges to the channel throughout their length ... ... 9. *zanzibarica.*

Adult leaves with green edges to the channel or with white or red edges only for a few inches at the base or apex:—

Central leaves of adult plants with slight but evident grooves down the sides and back, half-cylindric with a broad concave channel down the face; flowers 2–5 in a cluster. (See also 26, *S. Volkensii*) ... ... 25. *lanuginosa.*

Central leaves of adult plants without grooves on the rounded back, except when withered, 4–10 lin. broad, $2\frac{1}{2}$–4 lin. thick, concave-channelled down the face ... ... 27. *zeylanica.*

C.—Leaves either narrow and channelled, but in transverse section at their middle not more than 3–4 lin. thick, or flat or slightly concave and six to many times as broad as they are thick at the mid-rib, never cylindric nor half-cylindric; flower-stem not branched.

*Edges of the leaves of adult plants green (or from rubbing or injury very narrowly whitish in places, not all along), apex tipped with a soft green subulate point $\frac{1}{8}$–$3\frac{1}{2}$ in. long.

†Leaves of adult plants $\frac{1}{3}$–$1\frac{1}{2}$ (or in 35, *S. subspicata* up to $2\frac{1}{4}$) in. broad, 4–24 to a growth, deeply channelled, concave or flattish, broadly linear, strap-shaped or narrowly lanceolate:—

Leaves linear or narrowly linear-lanceolate, and usually more than 1 (and up to $2\frac{1}{2}$) ft. long:—

Central leaves of adult plants $2\frac{1}{2}$–4 lin. thick at the middle, ascending or erect, rather rigid:—

Leaves straight, with several grooves down the back, which are stated to be woolly ... 25. *lanuginosa.*

Leaves slightly recurving at the upper part, not grooved on the back except when withered, very dark green ... ... 27. *zeylanica.*

Central leaves of adult plants $1\frac{1}{2}$–2 lin. thick at the middle:—

Central leaves sub-erectly or ascendingly recurving, concavely channelled, rather stiff ... ... 28. *Roxburghiana.*

Central leaves very erect, straight, flattish, with a slight angular channel, flexible ... 29. *burmanica.*

Leaves either not linear or mostly not more than 1 ft. long, but varying from $\frac{1}{2}$–2 ft. long:—
Stem usually evident, 1–5 in. high, leaves very concave, $\frac{1}{3}$–$1\frac{1}{6}$ in. broad, not very flexible, with subulate green points, mostly $1\frac{1}{2}$–3 in. long, variegation distinct; lower flowers in pairs ... ... 33. *parva*.

Stem none or scarcely evident (in *S. Dooncri* sometimes 1–2 in. high, but concealed by the leaf-sheaths); leaves flattish or but slightly concave:—
Leaves usually numerous, but varying from 4–20 to a growth, $\frac{1}{2}$–2 ft. long:—
Leaves $\frac{1}{2}$–$1\frac{1}{2}$ in. broad, with subulate green points $\frac{1}{4}$–2 in. long; flowers 2 or more in a cluster:—
Leaves erect or sub-erect, nearly straight, stiff, very distinctly marked with sub-regular light green and dark green transverse bands and several longitudinal dark green lines on the back 31. *grandicuspis*.
Leaves recurved-spreading, flexible, indistinctly and very irregularly transversely banded, without dark green longitudinal lines on the back ... 32. *Dooneri*.
Leaves 1–$2\frac{1}{4}$ in. broad, firm or sub-flexible, with subulate green points 2–3 lin. long, deep green, but obscurely variegated when young; flowers usually solitary, sometimes in pairs, tube 14–15 lin. long ... ... 35. *subspicata*.
Leaves about 5 to a growth, 6–10 in. long, $\frac{1}{2}$–$1\frac{1}{4}$ in. broad, with subulate green points 2–4 lin. long, transversely banded; flowers in pairs, tube 19–21 lin. long ... ... 34. *concinna*.

††Leaves of adult plants 1–4 in. broad, usually more than 1 ft., and up to $4\frac{1}{2}$ ft. long, 1–8 to a growth, flat or concave, strap-shaped or lanceolate to elliptic:—
Leaves brightly and very conspicuously variegated with light green or whitish-green and dark green transverse bars at all ages, and sometimes striped with yellow. (In 40, *S. fasciata*, the young leaves also have green edges):—
Pedicels $3\frac{1}{2}$–6 lin. long, with the persistent part 2–5 lin. long; flower with a tube $4\frac{1}{2}$–5 lin. long, and lobes $5\frac{1}{2}$–6 lin. long ... 38. *nilotica*.
Pedicels $2\frac{1}{2}$–4 lin. long, with the persistent part 1–2 lin. long; flower with a tube 3–6 lin. long, and lobes 7–8 lin. long ... 39. *trifasciata*.
Leaves either rather inconspicuously or at least not brightly variegated with pale green and darker green transverse bars or cloudings or entirely green:—
Flowers mostly solitary, sometimes in pairs, tube 11–14 lin. long; pedicels $\frac{1}{2}$–1 lin. long; leaves $\frac{3}{4}$–2 ft. long, 1–3 in. broad ... ... 35. *subspicata*.
Flowers 2–6 in a cluster; pedicels 2–4 lin. long:—
Tube of the flower 13–14 lin. long; leaves 2–4 ft. long ... ... 44. *metallica* var. *longituba*.

Tube of the flower 3–8 lin. long:—
Leaves of adult plants 1–2¼ ft. (rarely more) long, 1–2½ in. broad:—
Pedicels jointed at or below the middle, with the upper or deciduous part 1¾–3 lin. long ... ... 36. *senegambica.*
Pedicels jointed at or near the middle with the upper or deciduous part 1–1½ lin. long ... ... 37. *subtilis.*
Leaves of adult plants usually 2–4½ ft. long, some less:—
Leaves 1–1¾ in. broad; pedicels jointed at or near the middle, with the deciduous or upper part 1–1½ lin. long; tube of the flower 3–4 lin. long 37. *subtilis.*
Leaves 1½–4 in. broad:—
Pedicels jointed at or above the middle with the deciduous or upper part 1–1¼ lin. long:—
Leaves 1½–2¾ in. broad; tube of the flower 4 lin. long ... ... 38. *nilotica* var. *obscura.*
Leaves 2–4 in. broad; tube of the flower 7–8 lin. long ... ... 44. *metallica* var. *nyasica.*
Pedicels jointed close to the obconic base of the flower, deciduous part scarcely evident; leaves 2–4 in. broad; tube of the flower 6–8 lin. long ... ... 44. *metallica.*

**Edges of mature leaves of adult plants reddish-brown or whitish, sometimes green when young.

†Tube of the flower 2½–5 in. long:—
Axis of the flower-spike 3–15 in. long; pedicels ¾–3 lin. long, jointed at the base of the flower or just above the middle; tube of the flower 2½–4 in. long ... ... 52. *longiflora* and var.
Axis of the flower-spike 2–3 in. long, and the spike often head-like:—
Pedicels 3–5 lin. long, not jointed; tube of the flower 4½–5 in. long:—
Leaves greyish-green, rather obscurely marked with paler spots or transverse bars ... 51. *Kirkii.*
Leaves dark green, conspicuously and often brightly marked with whitish or buff-coloured spots and irregular bars ... 51. *Kirkii* var. *pulchra.*
Pedicels 1–1½ lin. long, jointed above the middle, with the persistent part ½–1 lin. long; tube of the flower 3½–4½ in. long ... 53. *bracteata.* (See also 54, *S. Braunii.*)

††Tube of the flower, where known, under 2 in. long:—
Leaves of adult plants ½–¾ in. broad, 12–30 to a growth, 5–17 in. long, linear, deeply channelled down the face, with a subulate white tip ¾–1⅙ in. long, slightly rough ... 30. *aethiopica.*
Leaves of adult plants 1–6 in. broad, flat or slightly concave, with the subulate tips hard and reddish-brown, or softer and green when young, sometimes withering to whitish:—

Leaves very distinctly rough on the under-surface or on both sides, with very distinct transverse ridges as seen under a lens; pedicels jointed at the middle ... ... 41. *abyssinica.*

Leaves nearly or quite smooth, or if slightly rough beneath (in *S. thyrsiflora* and *S. Dawei*) not with very distinct transverse ridges under a lens:—

Leaves elliptic, oblong or very broadly lanceolate, $2\frac{1}{2}$–6 in. broad:—

Pedicels 1–2 lin. long, jointed close under the flower; flower-tube 9 lin. long ... 49. *grandis.*

Pedicels 2–3 lin. long, jointed at or slightly above the middle; tube of the flower 10–14 lin. long ... ... 49. *grandis* var. *zuluensis.*

Leaves elongate-lanceolate, narrowly lanceolate or strap-shaped, 1–5 in. broad:—

Leaves 5–12 to a growth, ascending—spreading, $1\frac{1}{6}$–3 in. broad, narrowly lanceolate; flower-tube 9–$10\frac{1}{2}$ lin. long 47. *angustiflora.*

Leaves 1–6 to a growth, erect to spreading:—

Leaves dull green, marked with blackish-green longitudinal lines, but without transverse paler green bands or only faintly marked with them beneath when young; tube of the flower $1\frac{1}{2}$–$1\frac{2}{3}$ in. long ... ... 43. *conspicua.*

Leaves without blackish-green longitudinal lines:—

Leaves of adult plants mostly under $1\frac{1}{2}$ ft. long, 1–$3\frac{1}{2}$ in. broad, more or less conspicuously marked with transverse bands of pale green; flower-tube about 9 lin. long ... 48. *thyrsiflora.*

The larger or most of the leaves of adult plants more than 2 ft. long, but often mingled with some that are less, some or all of them with more or less evident paler markings, at least on the under surface (according to *Dawe*, the leaves of 46, *S. Dawei*, are uniformly green on both sides, but on the living plants seen they are variegated):—

Leaves of adult plants 2–6 to a growth, the larger 2–3 ft. long:—

Pedicels jointed close under the flower, with no deciduous part:—

Leaves with distinct dark red-brown edges ... ... 16. *Dawei.*

Leaves with whitish or pale reddish-brown edges ... ... 11. *metallica* var. *longituba.*

Pedicels jointed at or above the middle with a distinct deciduous part:—

Leaves very flexible, recurved—spreading or upper part sometimes drooping, variegated with narrow dark green and broader pale or whitish-green transverse zig-zag bars on both sides, not glaucous ... ... 40. *fasciata.*

Leaves rigidly coriaceous, sub-erect or slightly recurving, variegated with broad dark green and narrower paler green transverse bars, more or less glaucous ... ... 42. *chinensis.*

Leaves of adult plants mostly 1–3 (rarely 4) to a growth, the larger 3–5 ft. long:—

Leaves rigid, 3–4 lin. thick at the middle, distinctly variegated, more or less glaucous; sheaths of flower-stem 2–5½ in. long, all green and firm, or the upper becoming submembranous ... ... 50. *Raffillii* and var.

Leaves more or less flexible or firmly coriaceous, 1½–2 lin. thick at the middle, not glaucous; sheaths of flower-stem ½–4 in. long, whitish or whitish-brown, thin, sub-membranous:—

Leaves mostly 2½–5 ft. long, and 2–4 in. broad, with petioles 4–24 in. long ... 44. *metallica* and var.

Leaves mostly 2–3 ft. long and 3–5 in. broad, convolute at the base without a very evident petiole ... ... 45. *liberica.*

1. S. bagamoyensis, *N. E. Brown*, in Kew Bull. 1913, p. 306. *Stem* erect, height unknown, but evidently frutescent, the specimen seen consisting of a terminal piece 2½ in. long and 5 lin. thick, bearing 8 leaves and a terminal panicle. *Leaves* from all round the stem, closely placed, with their sheaths embracing one another at the base, recurved or recurved-spreading from the base, smooth, 7–15 in. long, ⅔ in. or less broad, ⅛ in. thick at the middle, rigid when dry, linear-lanceolate or linear, tapering to a very acute hard spine-like brown point ⅙ in. or more long, concave-channelled down the face, with a very narrow red-brown line edged with a white membrane along the margins. *Panicle* terminal, 16 in. long, with a spread of about 10 in., laxly branched from 1¼ in. above the base, without sheaths or barren bracts below the lowest branch; branches simple, the lower 6–8 in. long and 1–1¼ in. apart, the upper 2½–4 in. long, with a tendency to approximate in pairs ¾–1 in. apart. *Bracts* under the branches lanceolate, tapering to a very acute point, spreading, the lower

$\frac{3}{4}$–$1\frac{1}{6}$ in. long, the upper gradually smaller; bracts under the flower-clusters $\frac{1}{12}$–$\frac{1}{8}$ in. long, lanceolate, acute, membranous, white. *Flowers* in clusters of 2–4, laxly scattered along the branches; pedicels in fruit $\frac{1}{4}$ in. long, jointed at the middle, with the persistent part $\frac{1}{8}$–$\frac{1}{7}$ in. long; tube $\frac{1}{4}$ in. long, $\frac{1}{2}$ lin. in diam.; lobes rather more than $\frac{1}{4}$ in. long, narrowly linear, obtuse.

German East Africa. Near Bagamoyo, *Sacleux*, 672!

According to Sacleux this is called *Mkonge doume* by the natives, meaning "Male Sansevieria," the distinctive term male being applied to a useless kind and female to kinds of which they make some use. Described from a dried specimen in the Paris Herbarium.

2. **S. arborescens**, *Cornu* ex *Gérôme and Labroy* in Bull. Mus. D'Hist. Nat. 1903, vol. ix. pp. 170, 172, 173, fig. 20 (fig. 2, c and d). *Stem erect*, 3–4 ft. high, $\frac{3}{4}$–1 in. thick, terete, leafy throughout. *Leaves* directed all ways, not in 2 rows, very spreading or recurving, and usually slightly twisted, smooth, 8–18 in. long, $\frac{3}{4}$–$1\frac{3}{4}$ in. broad, $\frac{1}{12}$–$\frac{1}{6}$ in. thick at the base, flat or concave, narrowly lanceolate or broadly linear-lanceolate, acute, with a stout subulate point $\frac{1}{3}$–1 in. long, which is green below, and hardened into a pale brown pungent spine at the apex, scarcely or but slightly narrowing to the sheathing base, basal part often (more rarely the whole leaf) channelled, upper part slightly concave to nearly flat above, with slightly recurved more or less wavy margins, grass-green, entirely without markings on both sides, with hardened whitish or reddish edges $\frac{1}{4}$ lin. broad. *Flowers* unknown—De Wildeman, Notices Pl. Utiles du Congo, pp. 624–625, fig. 20.

British East Africa: Taru desert or jungle, very common; *Powell*, 4! Rabai Hills, near Mombasa, *Taylor*! Also stated by Gérôme and Labroy to have been sent from Zanzibar to Paris Botanic Garden by *Sacleux*.
Described from a living plant cultivated at Kew.

3. **S. Powellii**, *N. E. Brown* (fig. 1). *Stem* erect, 3–4 (or more?) ft. high, 1 in. thick, cylindric, leafy throughout or naked, and marked with ring-like scars for a few inches at the base. *Leaves* in two more or less spirally-twisted ranks, spreading, slightly recurved, and often curved to one side, or slightly twisted, slightly rough, 1–$2\frac{1}{4}$ ft. long, $\frac{7}{8}$–$1\frac{1}{8}$ in. broad, and about $\frac{1}{2}$ in. thick (measuring from the bottom of the channel) just above the shortly clasping base, thence gradually tapering in a straight line to a hard pale brown very acute spine-like point, and with a concave channel down the face as broad as the leaf, extending nearly to the terete apex, bordered by an exceedingly narrow red-brown line edged with white, very convex on the back, but not at all keeled, at first uniformly somewhat grass-green, without markings, faintly glaucous, becoming dark bluish green with age. *Panicle* in the specimen seen about 18 in. long, with ascending-spreading branches 4–6 in. long. *Bracts* very small, $\frac{1}{2}$–1 lin. long, fleshy and convex, with a minute membranous tip; the fleshy part exudes a drop of sweet nectar. *Flowers*, 4–6 in a

Fig. 1.

S. Powellii, *N. E. Br.* Plant $\frac{1}{6}$ nat. size; A, seedling; B and C, sections of two different leaves taken at 6 in. above base; D, flower. From the type cultivated at Kew. Figs. A–D nat. size.

cluster, of a rather dingy greenish-white, marked with dull brownish-purple slender lines outside; pedicels about $\frac{1}{8}$ in. long, jointed at or slightly above the middle; tube 3 lin. long and about $\frac{3}{4}$ lin. in diameter above the slightly swollen base; lobes $4\frac{1}{2}5$ in. long, linear, obtuse. *Anthers* pale green.

British East Africa. Mackinon Road, common, *Powell*, 5! Also at mile 104, near the Afro-American Fibre Works at Voi; only a few plants seen, *Powell*, D.

Described from a living plant sent to Kew by Mr. Powell as No. 5, in 1906, which flowered in June, 1914.

Although nearly allied to *S. caulescens* and resembling it in appearance, it is easily distinguished by the channel of the leaves being as broad as the full width of the leaf and by its paniculate (not spike-like) inflorescence.

4. **S. caulescens,** *N. E. Brown* (Fig. 2). *Stem* of the only plant seen erect, 2 ft. high, but perhaps growing taller, branching at the base above the ground, 1–$1\frac{1}{2}$ in. thick, leafy throughout. *Leaves* directed to all parts of the compass, not at all 2-ranked, spreading and slightly recurved, slightly rough, $1\frac{1}{2}$–$2\frac{3}{4}$ ft. long, $\frac{3}{4}$–$1\frac{1}{3}$ in. broad, and $\frac{1}{2}$–$\frac{3}{4}$ in. thick, measured from the bottom of the channel at the base, gradually tapering thence in a terete manner to a slender and very acute point, which is at first green, but at length becomes pale brown or whitish, and is not very hard, with a channel down the face always much narrower (except at the base) than the breadth of the leaf, extending nearly to the apex, broad and deeply concave at the base, gradually narrowing and becoming more shallow (but not acute) towards the apex, having acute and at first whitish-green, finally white edges; deep green, and when young with indistinct broad transverse darker green bands $\frac{1}{2}$–$1\frac{1}{4}$ in. apart, which become more or less obliterated with age, also marked on the very convex back with 9–12 darker green continuous or interrupted longitudinal lines, some of which, with age, become impressed and form slight furrows. *Flower-stem* 2–$2\frac{1}{4}$ ft. long, unbranched, with about 3 narrow acuminate sheaths 1–2 in. long on the lower part and a spike-like raceme of flower-clusters at the upper two thirds, glabrous, fuscous. *Bracts* very small, inconspicuous. *Flowers* 6–12 in a cluster, whitish; pedicels $3\frac{1}{2}$–$4\frac{1}{2}$ lin. long, jointed $\frac{3}{4}$–$1\frac{1}{4}$ lin. above the base, horizontally spreading, with the flower abruptly directed upwards; tube 7 lin. long, nearly 1 lin. in diameter, very slightly inflated at the base; lobes 9 lin. long, linear, obtuse.

British East Africa. Without locality, *Powell*!

Described from a living plant sent from Nairobi without a number or information as to locality where it was collected by Mr. Powell in 1906. It flowered at Kew in May, 1913. With it were sent specimens of the somewhat similar *S. arborescens*, so that it may possibly be a native of the Taru district, where the latter species grows.

The leaves of *S. caulescens* are brittle, so that they are probably of little or no value for fibre.

FIG. 2.

S. caulescens, *N.E.Br.* Plant $\frac{1}{8}$ nat. size; A, section 6 in. above base of leaf; B, flower.

S. arborescens, *Cornu.* (Habit like that of *S. caulescens.*) C and D, sections above middle of two different leaves. Figs. A-D, $\frac{3}{4}$ nat. size. All from plants cultivated at Kew.

5. **S. suffruticosa,** *N. E. Brown* (Fig. 3). *Stems* not rising erectly more than 1 ft. high, bushily branching $\frac{1}{3}$–3 in. above the ground, forming with the leaves clumps 2–2½ ft. high. *Aerial branches*, spreading or ascending, 3–10 in. long, ½–¾ in. thick, rooting, covered on the lower part with very acute or spine-tipped

Fig. 3.

S. suffruticosa, *N.E.Br.* Aerial branch $\frac{1}{6}$ nat. size; A, section of leaf just above sheath; B, section above sheath of old leaf, showing slight groves which form with age from shrivelling; C, flower. Figs. A–C, all nat. size. From the type cultivated at Kew.

white-edged green scales or sheaths ¾–1½ in. long, which gradually pass into the leaves on the apical part. *Leaves* 7–18 to a growth, usually irregularly directed, but sometimes more or less 2-ranked, both arrangements occasionally occurring on the same stem,

ascending or spreading, rough throughout or smooth at the basal part and rough above, ½–2 ft. long, ½–¾ in. thick, cylindric, sheathing at the base and usually with a concave channel extending from the sheath ¼–½ way up the leaf, gradually tapering to a very acute hard spine-like brown point 1½–2 lin. long, dark green, faintly banded with paler green when young, and marked with darker green continuous and interrupted longitudinal lines, which with age or on shrivelled leaves become impressed, forming slight furrows. *Flower-stem* 1–1¼ ft. high, 2–4 lin. thick at the base, green, thickly covered with minute whitish linear dots, and bearing 2–4 membranous long-pointed sheaths 1¾–2¾ in. long on the basal part and a compact spike-like raceme 1¾–2½ in. in diam. at the upper part. *Bracts* ½–2 lin. long, membranous, ovate, acute or acuminate. *Flowers* 2–5 in a cluster, whitish or greenish-white, sometimes with a slight reddish tinge outside; pedicels 1⅓–2 lin. long, variably jointed at or above the middle, with the persistent part 1–1½ lin. long; tube about 5 lin. long, less than 1 lin. in diameter, scarcely or but slightly enlarged at the base; lobes 6–7 lin. long, recurved-spreading or with reflexed (scarcely revolute) tips.

British East Africa. Nairobi River Falls, scarce, *Powell*, 13! and without precise locality, *Evans*!

Described from living plants sent from Nairobi by Mr. W. A. Evans in 1903, and by Mr. H. Powell in 1906 to Kew, where they have flowered on two or three occasions.

6. **S. Phillipsiae,** *N. E. Brown* in Hook. Ic. Plant, vol. xxx, t. 3000. *Plant* with short erect stems branching at or above ground-level, forming irregular clumps about 1–1¼ ft. high. *Branches*, 3–8 in. long, ½ in. thick, more or less horizontal or spreading on the ground and ultimately rooting, ending in a tuft of leaves, clothed below the tuft with overlapping broadly deltoid-ovate sheaths or scales ⅔–1¼ in. long, tapering from the base into the apical spine, dull green, with a membranous white edge to a narrow brown border, withering to whitish-brown. *Leaves* usually 5–10 to a growth, directed to various points of the compass, when young ascending or suberect, ultimately very spreading and slightly recurved, rigid, smooth, 4–18 in. long, ½–¾ in. thick, cylindric, with 5–10 longitudinal impressed lines or slight furrows extending from base to apex and a deeply concave sheathing portion 2–3½ in. long at the base, with acute white edges, gradually tapering upwards and rather suddenly narrowed at the apex into a hard brown acute or obtuse point ⅛–⅛ in. long, or the outer leaves of each tuft acutely spine-pointed; young leaves dull dark green, very faintly marked with transverse bands of slightly paler green, which become obliterated with age; old leaves uniformly very dark and slightly bluish-green. *Flower-stem* 14–18 in. high, bearing on the basal third 2–3 distant whitish-brown membranous sheaths 1–1½ in. long, which gradually taper from their base to an acute point, and on the upper two-thirds a spike-like raceme of flower-clusters. *Bracts* ⅛–¼ in. long, ovate or ovate-lanceolate, acute, membranous. *Flowers* 3–6 in a cluster, white; pedicels 1¼–1½ lin. long, jointed at or slightly

above the middle, with the deciduous part thickened upwards, tube 5 lin. long, 1 lin. in diam. at the scarcely enlarged base; lobes $5\frac{1}{2}$–6 lin. long, linear, obtuse, not widely spreading and but slightly revolute.

British Somaliland. *Mrs. Lort Phillips*!

Described from a living plant which flowered at Kew, January, 1912, originally received in 1900 from Cambridge Botanic Garden, where it was introduced from Somaliland by Mrs. Lort Phillips.

7. **S. gracilis,** *N. E. Brown* in Kew Bulletin, 1911, p. 96 (Fig. 4). *Stem* 1–3 in. high, hidden by the leaf-sheaths, producing above the ground lateral procumbent and slightly ascending-

Fig. 4.

S. gracilis, *N.E.Br.* Plant $\frac{1}{6}$ nat. size; A, section at middle of leaf, nat. size; B, flower, not fully open, nat. size; C, part of tube of flower, showing the minute tubercules at base, enlarged. From the type cultivated at Kew.

spreading branches $\frac{1}{2}$-3 ft. long and $\frac{1}{4}$ in. thick, covered with adpressed ovate very acute and somewhat spine-pointed sheaths $\frac{1}{2}$–1 in. long, of which the upper gradually pass into the leaves, at first green with white margins, withering to white. *Leaves* 8–12

to a growth, directed all ways, closely placed, ascending or spreading, straight or curved or slightly sinuous, firmly flexible, not rigid, nearly or quite smooth, the outer of each tuft much shorter than the inner, concave down the face, very rounded on the back; inner or fully developed leaves $\frac{3}{4}$–$2\frac{1}{2}$ ft. long, sheathing, and concave-channelled for 2–5 in. at the base, cylindric above, 3–$4\frac{1}{2}$ lin. thick at the top of the sheath thence gradually tapering to a very acute spine-like brown or whitish point 1–3 lin. long, at first without grooves or channels, becoming faintly to deeply grooved on the oldest or shrivelled leaves, deep grass green, sometimes inconspicuously marked with narrow darker green bands on the young leaves and with some slightly darker continuous or interrupted longitudinal lines; margins of the basal sheaths with membranous white edges. *Flower-stem* $\frac{1}{2}$-1 ft. high, $\frac{1}{10}$-$\frac{1}{8}$ in. thick, light green, with 2-3 membranous sheaths $\frac{2}{3}$–$1\frac{1}{4}$ in. long and tapering to an acute point on the lower half or two-thirds; upper part with a lax spike-like raceme about $2\frac{1}{2}$–3 in. long. *Bracts* 1–$1\frac{1}{2}$ lin. long, membranous, lanceolate or linear-lanceolate, acute, spreading. *Flowers in pairs*, ascending, white; pedicels with the persistent part up to the articulation $\frac{1}{2}$–$\frac{3}{4}$ lin. long, smooth, the deciduous part usually formed by the tapering base of the flower-tube being scarcely pedicel-like in this species (except in dried flowers), and is minutely tuberculate, in dried flowers the tubercles disappear; tube (including the tapering tuberculate basal part) $\frac{3}{4}$-1 in. long, $\frac{3}{4}$-1 lin. in diam. at the slightly swollen base, more slender above; lobes 5-6 lin. long, linear, obtuse.

Tropical Africa. British East Africa, fairly common at Mazeras, *Powell*, 11! German East Africa. Without locality, *Busse*, 299!

Described from living plants sent by Mr. Powell to Kew, where they flowered in Dec., 1910, and Feb., 1912.

8. **S. rorida**, *N. E. Brown*. *Stem* 3–9 in. high, entirely covered or formed by the sheathing leaf-bases. *Leaves*, 11–15 to a growth, in 2 ranks, the inner or more fully developed ascending-spreading, the outer more spreading, becoming smaller and passing into sheaths. Fully developed leaves "horn-like," cylindric, and with an acute channel down the face towards the apex, becoming flattish above towards the base, 1–$1\frac{3}{4}$ ft. long, 1–$1\frac{1}{3}$ in. broad, and $\frac{3}{4}$–1 in. thick at the base, straight or slightly recurved, gradually tapering from the shortly sheathing base to the spine-pointed apex; rigid, green, marked with very numerous darker longitudinal lines on the back and sides, somewhat glaucous; the channel with acute reddish-brown margins, narrowly edged with whitish. *Flower-stem* about 3 ft high, twice as long as the leaves, slightly flexuose, laxly branched into numerous spike-like racemes at the upper two-thirds, and with 2 acuminate sheaths $1\frac{1}{3}$-2 in. long clasping and adpressed to the stem on the basal third; racemes horizontally spreading or slightly deflexed, 3–7 in. long, bearing flower-clusters nearly to their base. *Bracts* very small, deltoid, acute, membranous. *Flowers*, 3–6 in a cluster, spreading at a right angle to the branch, and mostly

directed to the upper side; pedicels about 1 lin. long, jointed at the apex; tube about 3 lin. long, nearly cylindric, slightly inflated at the base; lobes 5–6 lin. long, much longer than the tube, spreading-recurved, linear, obtuse, whitish-yellow, with a reddish stripe down their middle.—*Sansevierinia rorida*, Lanza in Bull. Ort. Boi. Giard. Colon. Palermo, vol. ix. p. 208, t. 5a, 6a.

Italian Somaliland. In sandy places on the coast near Magadoxo (Mogadiscio), *Macaluso*.

Of this species I have only seen a seedling plant.

9. **S. zanzibarica**, *Gérôme and Labroy* in Bull. Mus. Hist. Nat. 1903, pp. 170, 172, 173, fig. 19. "*Scarcely caulescent. Leaves* 2-ranked, crowded" (ex *Gérôme and Labroy*); two leaves only have been seen, which are apparently recurved-spreading, thick and very rigid, $\frac{1}{2}$–1 ft. long (apex not seen), $\frac{3}{4}$–1 in. broad, and about $\frac{1}{2}$ in. thick measured from the bottom of the channel; linear-lanceolate, shallowly concave down the face, very obtusely and triangularly keeled down the back; dull dark green, overspread with bluish-grey (from age?) on both sides, with reddish-brown edges to the channel, but without markings. *Flowers* unknown.—De Wildeman, Notices Pl. Utiles du Congo, pp. 625, 636, fig. 19. *S. Ehrenbergii*, Gérôme and Labroy in Bull. Mus. Hist. Nat. 1903, pp. 169, 173, fig. 18; and De Wildeman, Notices Pl. Utiles du Congo, pp. 624–625, fig. 18, not of Schweinfurth.

Tropical Africa. Zanzibar or German East Africa, *Sacleux*!

Of this species I have only seen two living leaves from the type plant, sent to Kew from Paris Botanic Garden, from which the above description is made, but I am unable to say if they were the outer leaves of a growth or the fully developed central leaves of an adult plant; they are not described at the original place of publication.

The plant described and figured as *S. Ehrenbergii* by Gérôme and Labroy is utterly different from that species, and a leaf of it sent to Kew is certainly not distinct from those of *S. zanzibarica*. The authors even state that they are alike, but that the supposed *S. Ehrenbergii* differs from *S. zanzibarica* by the presence of a furrow on each side of the mid-rib down the back of the leaf. These furrows are merely due to shrinkage from age or imperfect root action, and are of common occurrence on old leaves of most species; they are never of specific importance in any of the species having leaves that are broader than thick.

10. **S. Perrotii**, *Warburg* in Tropenflanzen, 1901, p. 190, with a figure. *Stem* erect, 6–8 in. high, covered by the bases of the leaves, $\frac{3}{4}$–1 in. thick. *Leaves*, 8–12 to a growth, 2-ranked, ascending or spreading, the inner of adult flowering plants 3–5 ft. long, with a deep concave-channel as broad as the leaf throughout their length, very obtusely keeled or rounded on the back, slightly compressed, about $\frac{3}{4}$–1 in. broad and 5–7 lin. thick from the bottom of the channel to the back near the base, thence very gradually narrowing to the apex, with hard whitish acute tips;

margins of the channel acute, reddish-brown, with white membranous edges. *Flower-stem* 4 ft or more high, bearing 3–4 distant membranous acute sheaths 1½–2 in. long on the lower part, paniculately branched above. *Flowers*, in clusters of 2–4, somewhat laxly scattered along the branches; pedicels about 1 lin. long; tube about ¼ in. long, pale greenish; lobes about 4½ lin. long, recurved-spreading, whitish on the inner surface, purplish on the back.—De Wildeman, Notices Pl. Utiles du Congo, pp. 626, 627, 633.

German East Africa. Among bushes, on coral-rock formation, near Lindi, *Perrot*.

Described partly from the original description and figure, partly from a very fine life-sized drawing at Kew of a plant sent by Dr. Stuhlmann from Dar-es-Salaam to the Calcutta Botanic Garden, where it flowered in March, 1904.

11. **S. robusta,** *N. E. Brown*. *Rootstock* stout, creeping. *Stem* of adult plants 1–2 ft. high, erect, covered by the bases of the leaves, 1 in. or more thick. *Leaves* 6–14 to a growth, 2-ranked, crowded, erect or slightly spreading in a fanlike manner, smooth, the inner of adult flowering plants 3–7 ft. long, the outer shorter, all laterally compressed, with flattened sides, very rounded on the back, with a triangular channel as broad as the leaf and 4–5 lin. deep all down the face, ¾–1⅓ in. thick from side to side and 1¼–1¾ in. thick from front to back near the base, thence gradually tapering upwards and rather abruptly narrowed into a hard spine-like brown point ¼–½ in. long at the apex; dark green, faintly glaucous, with 14–30 longitudinal continuous or interrupted darker green lines, usually arranged in groups of 2–4, which with age shrink into slight furrows, otherwise without bands or spots, the acute margins of the channel narrowly bordered with red brown and edge with white. *Flower-stem* about 4 ft. high, paniculately branched above, with the flower-clusters rather distantly scattered along the branches. Persistent part of the *pedicels* ½–¾ lin. long. *Flowers* not seen.

British East Africa. Between Voi and the Taita Hills, *Grenfell*, 6! 13! 18! Voi, *Powell*!

Described partly from living plants cultivated at Kew, partly from dried specimens, which are without flowers and have only a very imperfect panicle. This species yields an abundance of fibre of good quality.

S. robusta is closely allied to *S. Ehrenbergii*, but the taller stem and more numerous leaves seem well to distinguish it, the tubercles bearing the clusters of flowers upon the only inflorescence seen are neither so closely placed nor so prominent on the branches of the panicle as in the Nubian plant, and when flowers are forthcoming, these may prove to be distinct.

12. **S. Ehrenbergii,** *Schweinfurth* ex. Baker in Journ. Linn Soc. vol. xiv, p. 549. *Stem* 0–9 in. high, concealed by the leaf-bases. *Leaves* 5–9, crowded, 2-ranked, erect or more or less spreading fanwise, faintly rough, 2½–6 ft. long, 1–1¼ in. thick from side to side, 1¼–1¾ in. thick from front to back, laterally

compressed, with flattened sides, rounded on the back, tapering upwards, rather abruptly ending in a stout hard spine-like point $\frac{1}{4}$–$\frac{1}{2}$ in. long, with a triangular channel as broad as the leaf all down the face and 5–12 shallow grooves or impressed lines down the sides and back, dark green, with the grooves or longitudinal lines blackish-green, without transverse markings; margins of the channel acute, reddish-brown, with white membranous edges, usually spreading to a slightly wider breadth than the rest of the leaf at the basal part. *Flower-stem* up to $6\frac{1}{2}$ ft. high, paniculately branched at the upper three-fourths of its length; branches $\frac{1}{4}$–$1\frac{3}{4}$ ft. long, curved, ascending, the lower branched, the upper simple. *Flowers* 4-7 in a cluster; pedicels $1\frac{1}{4}$–2 lin. long, jointed above the middle; tube $2\frac{1}{2}$–3 lin. long; lobes $3\frac{1}{2}$ lin. long, linear, obtuse.—Baker in Kew Bulletin 1892, p. 129; Oliver in Hooker, Ic. Plant. t. 2269; Schweinfurth in Bull. Herb. Boiss, vol. ii, Append. 2, p. 78; Engler, Pflanzenw Ost-Afr. C. p. 144, t. 6; Baker in Fl. Trop. Afr. vol. vii, p. 334; De Wildeman, Notices Pl. Utiles du Congo, p. 631, but not of pp. 624 and 625; Pirotta, Flor. Col. Eritrea, 253; Fiori Boschi e Piante Legn. Eritrea, 104; not of Gérôme and Labroy.

Nubia. Wady Ossir, south of Suakin, *Schweinfurth*, 31! and other localities in the interior, ex *Schweinfurth*. Eritrea. Near Aidereso, 4000 ft. alt., *Schweinfurth and Riva*, 1835!

Somaliland. Without precise locality, *Stace*!

The above description is made partly from a photograph and a living plant cultivated at Kew, both of which were received from Somaliland, and partly from Schweinfurth's specimen 31.

The plant which K. Schuman has figured and described in his edition of Hemprich & Ehrenberg, Symbolae Physicae, p. 27, t. 13, fig. 2, as *S. Ehrenbergii*, is, I believe, a totally different species, which cannot be determined until living plants of it are obtained.

Dr. Schweinfurth also states that this plant is a native of Arabia and German East Africa, but he informed me that he had not compared living plants from these two regions with each other nor with the Nubian plant, I therefore have very much doubt as to the correctness of this identification, as from the evidence at present before me, the range of the various species, so far as known, seems limited.

The fibre of *S. Ehrenbergii* is used in Nubia and Egypt for making ropes, &c.

13. **S. deserti,** *N. E. Brown*. *Stemless*, with a stout creeping rootstock. *Leaves*, 7–8 to a growth, 2-ranked, erect, rigid, smooth, $2\frac{1}{2}$-$3\frac{1}{2}$ ft. long, 1–$1\frac{1}{4}$ in. (or perhaps more) thick at the base, compressed-cylindric, tapering from base to apex into a hard spine-like whitish point marked with a chestnut-brown band at its base and about $\frac{1}{2}$ in. long, channelled up to the apex on the face and with about 9 12 shallow grooves on the sides and back; the channel is narrow and acute with erect margins at the apical part, broadening and becoming more and more obtusely angular, with somewhat spreading margins and nearly as broad as the leaf towards the base; margins acute,

hardened, red-brown. *Flower-stem* probably about 2 ft. high, only portions of the base and apex seen, $3\frac{1}{2}$–$4\frac{1}{2}$ lin. thick at the base, with about 3 sheaths on the basal part and a long spike-like raceme of flower-clusters above. *Bracts* on the apical part $1\frac{1}{2}$–2 lin. long, ovate, obtuse, membranous, those below not seen. *Flowers* 4–6 (or more?) in a cluster; pedicels 3–$3\frac{1}{2}$ lin. (or more?) long, jointed below the middle, with the persistent part $1\frac{1}{4}$–$1\frac{1}{2}$ lin. long on the dried specimen seen. Tube $3\frac{1}{2}$–4 lin. long, scarcely or but slightly inflated at the base, about $1\frac{1}{4}$ lin. in diam.; lobes about $\frac{1}{2}$ in. long, linear, obtuse, revolute.

Bechuanaland. On the banks of the River Botletle in the Kalahari desert, 3000 ft. *Mrs. Lugard*, 9! shore of Lake Ngami and the River Botletle, *Nicolls*!

There is also a specimen that was sent from Buluwayo in Rhodesia, in the collection at the Imperial Institute and a portion of it at Kew, which appears to belong to this species.

14. **S. varians,** *N. E. Brown. Stemless. Leaves* 4–8 to a growth, two-ranked erect or ascending, straight or slightly curved, very slightly rough, $1\frac{1}{4}$–$3\frac{3}{4}$ ft. long, $\frac{1}{2}$–$\frac{7}{8}$ in. thick at the base, variable, on some growths of adult plants all or most of the leaves are cylindric, with an acute channel much narrower than the leaf and having green acute edges all down the face, gradually tapering to an acute hard whitish point $\frac{1}{6}$–$\frac{1}{3}$ in. long; on other growths a few of the outer leaves are half cylindric, shortly and somewhat abruptly acute, having a flattish or shallowly trough-shaped channel as broad as the leaf down the face, with acute hard red-brown margins often edged with a white membrane when young, dull dark grass-green, not glaucous, with numerous longitudinal dark green lines, some of which, with age, become impressed, forming slight furrows, when young indistinctly banded with dark and lighter green. *Flower-stem* 2–$2\frac{1}{2}$ ft. high, light glaucous-green or greyish-green, indistinctly marked with transverse mottlings on the upper part, bearing 2 distinct whitish membranous acuminate sheaths $\frac{3}{4}$–$1\frac{1}{2}$ in. long on the basal part and a long spike-like raceme of flower-clusters above. *Bracts* membranous, $\frac{1}{6}$–$\frac{1}{4}$ in. long, linear or filiform from a broadened base, acute, white. *Flowers* 6–10 in a cluster; pedicels 2–$2\frac{1}{2}$ lin. long, jointed slightly above the middle; tube 5–6 lin. long, white; lobes 7–8 lin. long, recurving or revolute, linear, obtuse, white, speckled with purple at the tips.

Country unknown.

Described from a living plant which had been cultivated for many years at Kew under the name of *S. zeylanica*, so that it may possibly be of Asiatic origin, but it is very closely allied to *S. patens*, differing by its leaves not being nearly so stout, fewer to a growth, erect or ascending instead of spreading from the base, and by having more flowers in a cluster. When seen growing side by side, *S. patens* and *S. varians* are quite different in appearance, although there is little to distinguish them technically. The plant flowered at Kew April 23, 1909, and May 2, 1914.

15. **S. patens,** *N. E. Brown* (*Fig.* 5). *Stemless. Rootstock* creeping $\frac{3}{4}$–1 in. thick. *Leaves* 5–10 to a growth, 2-ranked, recurved—spreading from their base in a fan-like manner, slightly rough, the inner of adult plants $1\frac{1}{2}$–3 ft. long, $\frac{2}{3}$–$1\frac{2}{3}$ in.

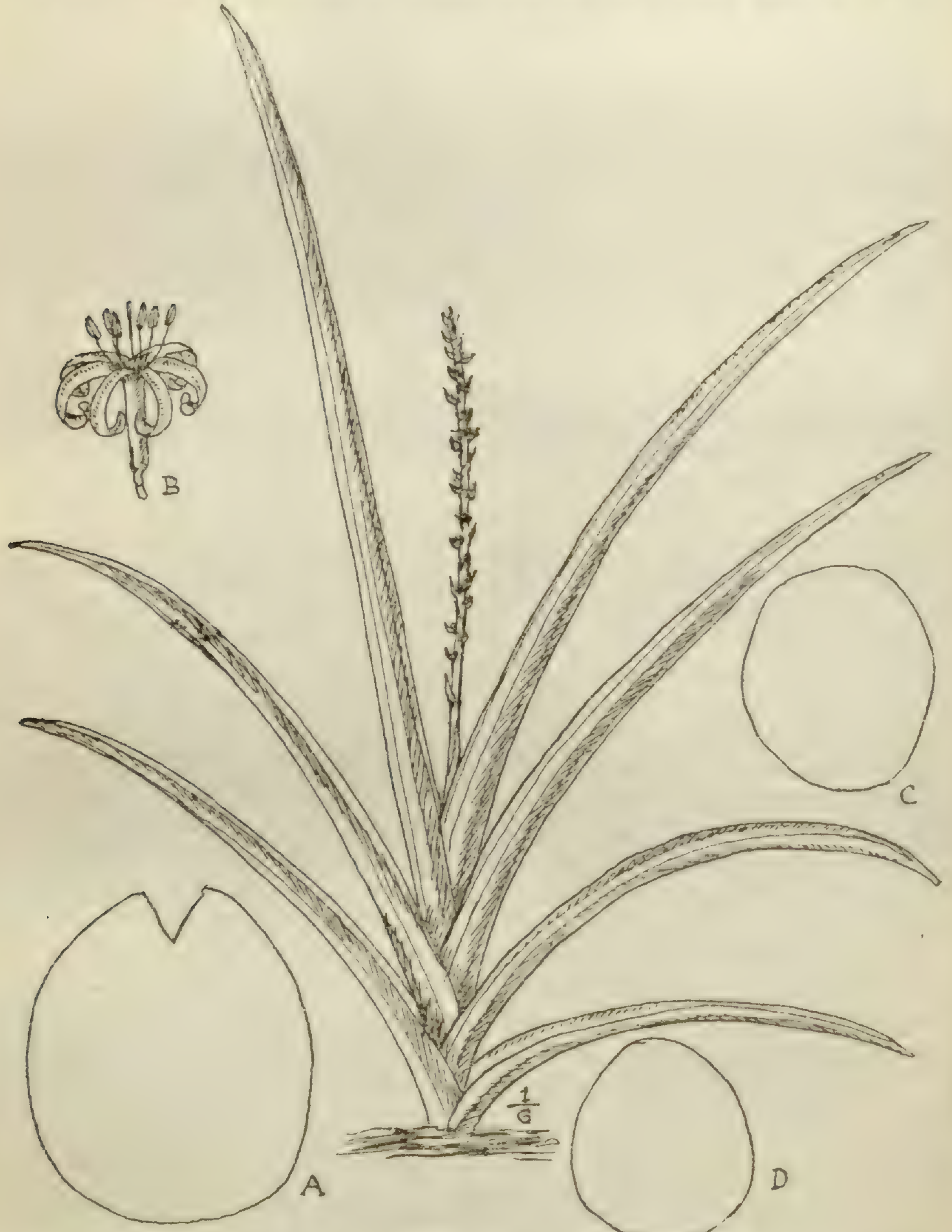


Fig. 5.

S. patens, *N.E.Br.* Plant $\frac{1}{6}$ nat. size; A, section at middle of leaf, nat. size; B, flower, nat. size.

S. cylindrica, *Boj.* C, section at middle of leaf of type; D, section at middle of leaf of var. **patula,** *N.E.Br.*, both nat. size. All from plants cultivated at Kew.

thick from front to back and $\frac{2}{3}$–$1\frac{1}{4}$ thick from side to side at the base, the outer gradually shorter, compressed-cylindric, with an acute channel much narrower than the leaf extending from base

to apex on the face, tapering upwards and at the apex somewhat abruptly contracted into a hard acute whitish point $\frac{1}{4}$–$\frac{1}{2}$ in. long, marked with a brown band at its base, somewhat indistinctly marked with dark green and paler green transverse bands, becoming bluish-green with age, longitudinally marked with numerous blackish-green lines, several of them continuous to the apex, others interrupted; margins of the channel acute, green, or only whitish along the basal 1-6 in. *Flower-stem* $1\frac{1}{4}$–($2\frac{1}{2}$?) ft. long, pale green, bearing 2–3 acuminate sheaths $\frac{3}{4}$–2 in. long on the basal third and a spike-like raceme of flower-clusters on the upper two-thirds. *Bracts* $1\frac{1}{2}$ 3 lin. long, lanceolate, acute, membranous. *Flowers* 2–3 in a cluster, white; pedicels $2\frac{1}{2}$–3 lin. long, jointed at the middle, with the persistent part $1\frac{1}{2}$–$1\frac{3}{4}$ lin. long; tube $4\frac{1}{2}$–5 lin. long, $\frac{3}{4}$ lin. in diam. slightly inflated at the base; lobes 6 lin. long, $\frac{1}{2}$ lin. broad, linear, revolute.

Tropical Africa. Origin unknown, but probably British East Africa.

Described from a living plant which flowered at Kew on April 4, 1910.

16. **S. intermedia,** *N. E. Brown* in Kew Bulletin, 1914. p. 83 (Fig. 6). *Stemless.* *Leaves* of adult plants 2–7 to a growth, not 2-ranked, erect or ascending, slightly recurving, stiff, not quite smooth, but with a surface something like that of ground glass, $1\frac{1}{2}$–4 ft. long, $\frac{1}{2}$–$\frac{3}{4}$ in. thick; the outer sometimes somewhat half cylindric with acute edges to the concave channel; the inner cylindric, channelled all down the face or occasionally the central leaf is without a channel, gradually tapering from the base to a very acute spine-like but not very rigid whitish point, with the channel much narrower than or at the basal part sometimes nearly as broad as the leaf, and having acute green or whitish edges at the basal part, passing into obtusely rounded green edges at the upper part, and with numerous slight grooves or impressed longitudinal lines on the sides and back, at first dull deep green, becoming slightly buish-green, with or without a faint indication of transverse banding. *Flower-stem* 8–18 in. high, with 2–3 acuminate sheaths on the basal 2–3 in. and a dense spike-like raceme of flower-clusters above, light greyish-green, from being covered with minute spots composed of "frosted" cells when examined with a lens. *Clusters* 3–6-flowered, very crowded. *Bracts* 1–2 lin. long, ovate or ovate lanceolate, acute, membranous. *Flowers* ascending-spreading; pedicels 1 lin. or less long, jointed at the apex; tube 7–9 lin. long, slightly ovoid-inflated and $1\frac{1}{4}$ lin. in diam. at the base, more slender above, pale greenish; lobes $\frac{1}{2}$–$\frac{3}{4}$ in. long, linear, obtuse, revolute, white or greenish-white and minutely dusted with purplish on the back at the apex.

British East Africa. Tsavo district, *Powell*, 9! and without precise locality, Powell 4!

Described from a living plant received from Nairobi in 1906, which flowered at Kew Nov. 5, 1913.

FIG. 6.

S. intermedia, *N.E.Br.* Plants $\frac{1}{6}$ nat. size; A, section 6 in. above base, and B, 15 in. above base of the same leaf, showing alteration from acute to rounded edges of the channel, nat. size; C, flower, nat. size. From the type plant cultivated at Kew.

17. **S. rhodesiana**, *N. E. Brown* (Fig. 7)—*Stemless*, with a stout creeping rootstock. *Adult leaves*, 3–4 to a growth, two-ranked, straight, or nearly so, and stiffly erect, sub-parallel, with the tips of the inner pair not or scarcely farther apart than at the base; slightly rough or nearly smooth, 3–5½ ft. long, 1⅛–1¼ in. thick from side to side, and ¾–1¼ in. thick from front to back at the base; subcylindric, gradually tapering from the base to a stout hard acute whitish or whitish-brown point ¼–½ in. long, with a broad open concave channel on the face of the outer leaves

Fig. 7.

S. rhodesiana, *N.E.Br.* Plant $\frac{1}{6}$ nat. size; A, section 15 in. above base of a leaf grown at Kew; B, section 12 in. above base of a leaf of same plant on arrival from Rhodesia, showing formation of grooves in withering; C, flower. Figs. A–4, nat. size. From the type cultivated at Kew.

and an acute channel much narrower than the breadth of the leaf on the inner leaves, extending from the base nearly or quite to the apex, uniformly deep green, without transverse bands, but marked with very numerous continuous or interrupted longitudinal darker green lines, of which 10–12 or more are impressed, forming slight furrows; margins of the channel acute, dark red brown, with or without white membranous edges. *Flower-stem* about $1\frac{3}{4}$ ft. high and $\frac{1}{3}$ in. thick at the base, pale green, mottled with darker, bearing about 2 narrow acuminate sheaths $1\frac{1}{2}$–$2\frac{1}{2}$ in. long on the basal part, and a compact raceme about 15 in. long of numerous flower-clusters above. *Bracts* inconspicuous, $1\frac{1}{2}$–2 lin. long, membranous, acuminate. *Flowers* 8–9 in a cluster; pedicels $2\frac{1}{2}$–3 lin. long, jointed at or slightly below the middle, with the persistent part 1–$1\frac{1}{4}$ lin. long and the deciduous part thickened upwards, dingy whitish-green; tube 4–6 lin. long, 1 lin. in diam. at the very slightly swollen base, rather more slender above, white; lobes $7\frac{1}{2}$–9 lin. long, linear, obtuse, white. The flowers seem sometimes to open at night or early morning and close about 10 a.m.; at others they open in the forenoon and close about 4.30 p.m. The odour resembles that of an *Acacia*.

Rhodesia. Without precise locality. Described from a living plant sent by the Director of the Imperial Institute to Kew in 1908, where it flowered in January, 1912.

This species is closely related to *S. Pearsonii*, N. E. Br., but certainly seems distinct, when the living plants are placed side by side. The leaves of *S. rhodesiania* do not taper nearly so rapidly as those of *S. Pearsonii*, are parallel, and not diverging, more compressed, especially at the much less acute point, and the dark green lines are continuous (not interrupted) and more evident than in *S. Pearsonii*.

18. **S. sordida**, *N. E. Brown* (Fig. 8)—*Rootstock*, creeping. *Stem*, none or very short, and concealed by the closely imbricating leaf-bases. *Leaves*, 4–12 to a growth, 2- ranked, slightly spreading fanwise, straight, or slightly curved, remarkably rough, $2\frac{1}{4}$–$3\frac{1}{2}$ ft. long, $\frac{1}{2}$–$\frac{3}{4}$ in. thick from front to back and $\frac{1}{3}$–$\frac{1}{2}$ in. thick from side to side at the base, slightly compressed-cylindric, tapering into an acute spine-like whitish or grey point marked with brown at its base $\frac{1}{3}$–$\frac{1}{2}$ lin. long, with a channel all down the face, which is acute, and much narrower than the leaf for the greater part of its length, becoming flattened towards the base, and with 11–15 or perhaps more grooves down the sides and back, not caused by shrinkage, dull bluish-green, with numerous darker longitudinal lines, those in the grooves continuous, those between them interrupted; margins of the channel with a very narrow hardened dark brown border extending to the apex and more or less edged with a white membrane. *Flower-stem* 1–2 ft high and $\frac{1}{4}$ in. thick at the base; dull light green, minutely dotted with white, the upper $\frac{2}{3}$–$\frac{3}{4}$ with a spike-like raceme of numerous flower-clusters, and the lower third bearing 2–3 distant membranous sheaths $\frac{3}{4}$–$1\frac{1}{2}$ in. long, tapering from their base to a fine subulate point. *Bracts* $\frac{1}{8}$–$\frac{1}{4}$ in. long, subulate and soon withering from a stout green base, becoming rather inconspicuous. *Flowers* 7–14

FIG. 8.

S. sordida, *N.E.Br.* Plant $\frac{1}{6}$ nat. size; A, section at middle of leaf, showing the grooves; B, flower, both nat. size. From the type cultivated at Kew.

in a cluster, erect or ascending and pale dingy greenish when in bud, becoming horizontal or distinctly drooping when expanded; pedicels $\frac{1}{3}$–$\frac{1}{2}$ in. long, jointed at or below the middle, with the persistent part $\frac{1}{8}$–$\frac{1}{4}$ in. long, slender; tube $3\frac{1}{2}$–5 lin. long, white or greenish; lobes 7-8 lin. long, revolute, linear, obtuse, white on the inner face, green with minute dull purplish dots on the back. The *inflorescence* collectively is of a pale dull greenish colour.

NATIVE COUNTRY UNKNOWN. Described from a living plant cultivated at Kew, which flowered in March, 1910.

19. **S. Pearsonii**, *N. E. Brown*, in *Kew Bulletin*, 1911, p. 97 (Fig. 9).—*Stemless*, with a stout creeping rootstock. *Leaves of seedling or juvenile plants* 8–10 in a rosette, directed to all parts

FIG. 9.

S. Pearsonii, *N.E.Br.* A, adult plant; B, seedling, both $\frac{1}{6}$ nat. size; C, D and E, sections at middle of three successive leaves on a seedling, showing progressive stages towards the final cylindric leaves; F, section of leaf of adult plant 6 in. above base; G, fruit. Figs C–G nat. size. From the type cultivated at Kew.

of the compass, and recurved-spreading, rigid, $2\frac{1}{2}$–12 in. long, the outermost or smaller $\frac{7}{8}$–$1\frac{1}{4}$ in. broad, lanceolate, acute or acuminate, broadly and shallowly concave above, convex beneath and about $\frac{1}{6}$–$\frac{1}{4}$ in. thick, the inner gradually becoming thicker, more deeply concave, narrower, and finally passing into the erect and

cylindric form; dull dark green, indistinctly or the inner distinctly banded with paler green; margins acute, with a red-brown line inside a membranous white edge; epidermis rather rough. *Leaves of adult growths* 3-5, in two ranks, straight, or nearly so, rigid, erect, but gradually diverging from base to apex, so that the inner are about $\frac{1}{2}$–1 ft. apart at the tips; smooth, $2\frac{1}{4}$–3 ft. long, about $1\frac{1}{3}$–$1\frac{1}{2}$ in. thick from front to back and $1\frac{1}{6}$–$1\frac{1}{4}$ in. thick from side to side at the base, cylindric, slightly compressed, gradually tapering from the base to a very acute, rigid, terete-subulate (not compressed) whitish point $\frac{1}{3}$–1 in. long, and with a channel much narrower than the breadth of the leaf on the inner face and extending nearly to the apex, concave at the basal part, acutely triangular at the upper part, slightly glaucous-green or bluish-green, when young somewhat faintly banded with paler green, rather inconspicuously marked with numerous very interrupted darker lines, and 9-12 continuous slightly impressed lines, forming slight longitudinal grooves; margins of the channel acute from base to apex, greenish-white in young leaves, becoming red-brown with a whitish edge. *Flower-stem* unknown; only one flower-cluster in fruit was found, with 4 pedicels $\frac{1}{3}$ in. long, jointed at about $\frac{1}{8}$ in. above the base. *Berries* orange.

Tropical Africa. South Angola: among rocks in open forest near Km. 108·5 on the Mossamedes Railway at 1700 ft.; *Pearson*, 2073! Also occurs between Gambos and Houmbe, ex *Pearson*. Damaraland: Grootfontein, in Upingtonia, *Schinz*, 15!

Described from a living plant sent to Kew by Prof. Pearson, and from seedlings raised from the fruit that accompanied it. I have not seen an inflorescence, and Prof. Pearson informs me that when he discovered the plant the flowering season was over, and, although he examined many plants, only some remains of a single inflorescence was found, consisting of the base of the flower-stem still attached to the plant, a single cluster of fruit and some loose berries laying on the ground, from which it could not be determined if the inflorescence was a panicle or a spike-like raceme. In all probability *S. Pearsonii* is the same species as that mentioned under the name of *S. cylindrica* by Baum (Kunene-Sambesi Expedition, pp. 25, 28, 78, 197, 460, 470 and 510), and (on p. 197) stated to have a narrow channel down the face of the leaf, found growing under trees and shrubs on termite-authills along the Chitanda River, between Kakele and Goudkopje at 4000 ft. elevation, and in the region of the Cunene and Kubango Rivers; also by Schinz (Deutsch-Sudwest-Africa, pp. 238, 472) as occurring near the Cunene River in Amboland, which is about 150 miles south-east of where Prof. Pearson collected the plant here described. The true *S. cylindrica*, Bojer, is a native of Loanda in Northern Angola, and its leaves are destitute of the acute channel down the inner face which characterises *S. Pearsonii;* they are also of a darker green.

20. **S. cylindrica,** *Bojer*, Hort. Maurit. p. 349 (Fig. 5, c).—*Stemless*, with a stout creeping rootstock 1-$1\frac{1}{2}$ in. thick. *Leaves* 3-4 to a growth, besides some basal sheaths, 2-ranked, stiffly erect,

not at all recurved near the base, faintly rough, $2\frac{1}{2}$–5 ft. long, cylindric or slightly compressed-cylindric, $\frac{7}{8}$–$1\frac{1}{4}$ in. thick from front to back and $\frac{3}{4}$–1 in. thick from side to side at the base, immediately above their 3–$5\frac{1}{2}$ in. long sheathing portion, gradually tapering thence to a hardened acute whitish point $\frac{1}{6}$–$\frac{1}{4}$ in. long, the outer sometimes with a very shallow and narrow groove down the inner face, green, or sometimes whitish-green, with distinct transverse bands of darker green, the banding becoming fainter with age; glaucous when exposed to the sun, marked with numerous interrupted and continuous longitudinal dark green or blackish-green lines, of which 4–6 extend nearly to the apex, and with age and the withering of the leaves become more or less impressed as slight grooves. *Flower-stem* 2–3 ft. high, its basal part bearing 2–3 distinct pale brownish sheaths $1\frac{3}{4}$–$2\frac{3}{4}$ in. long, its upper part with a spike-like raceme $1\frac{1}{4}$–$2\frac{1}{2}$ ft. long, with 5–6 flowers in each cluster. *Bracts* $\frac{1}{6}$–$\frac{2}{5}$ in. long, lanceolate or ovate-lanceolate, acuminate; bracteoles smaller, all spreading, membranous, very pale brownish when the flowers are expanded. *Flowers*, 5–6 in a cluster, white or tinted, with reddish pedicels jointed below or sometimes at the middle, with the persistent and deciduous parts each 1–2 lin. long; tube $\frac{2}{3}$–1 in. long, slender, $\frac{3}{4}$ lin. in diam., and before the ovary swells scarcely enlarged at the base; lobes $\frac{2}{3}$–$\frac{3}{4}$ in. long, linear, obtuse, revolute. Hook, Bot. Mag. t. 5093; Carrière in Rev. Hort., 1861, p. 447, figs. 109–110, and 1901, p. 192; Morren in Belg. Hort., vol. ix., p. 274, fig. 27; Baker in Journ. Linn. Soc., vol. xiv, p. 549; in *Kew Bulletin*, May, 1887, p. 9, fig. 6; and in Fl. Trop. Afr., vol. vii., p. 335; Rudolph in Rev. Hort., 1901, pp. 191–192, fig. 70; Godef.—Leb., Sansev. Gigant. Afr. Orient., p. 14; Gérôme and Labroy in Bull. Mus. Hist. Nat., 1903, pp. 169, 173, fig. 16; De Wildeman Notices Pl. Utiles du Congo, p. 624, fig. 16, and pp. 625, 631, with fig.; and Etud. Fl. Bas-et Moyen Congo, vol. ii. p. 121, t. 50–51; Volkens in Notizbl. Bot. Gart. Berlin. Append. 22, p. 52, fig. 21. *S. angolensis*, Welw. ex Hook, in Report on Veget. Prod. Paris Exhib., 1855, p. 148; Welw. Apont. p. 543; Carrière in Rev. Hort., 1861, pp. 447, 449; Monteiro, Angola and the River Congo, vol. i. pp. 45, 103; Hiern, Cat. Afr. Pl. Welw., vol. ii. p. 25.

S. guineensis, Weiner Illustr. Gart.-Zeit, 1887, p. 421, fig. 80, not of Willdenow.

Angola. Loanda; plentiful on sunny hills from Loanda to Cacuaco and elsewhere. *Welwitsch*, 3749! and cultivated specimens!

Known in Angola as the "Ife" or "Ifi" plant, and used for making ropes, etc.

Described from a living plant; a portion of the original figured in the *Botanical Magazine* at t. 5093. According to Monteiro, "*Sansevieria angolensis* is very plentiful all over the littoral region of Angola." Replacing *S. longiflora* at about Musserra, a little to the north of Ambriz. He, however, collected no dried specimens of either species, so that it is possible more than these two species may have been included by him under these names.

Var. **patula**, *N. E. Brown* (Fig. 5, D).—*Leaves*, 3–6 to a

growth, sometimes erectly diverging, but more often variably recurving or spreading, from a slight but somewhat abrupt recurvature near the base, $\frac{2}{3}$–1 in. thick from front to back and $\frac{1}{2}$–$\frac{7}{8}$ in. thick from side to side immediately above the $1\frac{1}{2}$–3 in. long sheathing portion; rather shortly or somewhat abruptly pointed. *Tube of the flower* $5\frac{1}{2}$–9 lin. long; lobes 7–9 lin. long. Otherwise as in the type.

Angola. Cultivated specimens!

Described from living plants cultivated at Kew.

Although Bojer, when publishing the name in 1837, stated that this species was a native of Zanzibar, there appears to be no evidence that it has ever been found wild there. Its history is as follows:—Bojer states that it was only cultivated (not wild) in Mauritius. According to Gérôme and Labroy in Bull. Mus. Hist. Nat., 1903, p. 169, it was introduced into the Jardin des Plantes, Paris, from the Isle of Bourbon, by Richard, in 1845. In 1861 Carrière published two excellent figures of it in the Revue Horticole, made from a living plant which had been sent from Mauritius to the Paris Exhibition in 1855, and Sir William Jackson Hooker (*Botanical Magazine*, t. 5093), writing at the end of 1858, also states that living roots had then been recently received from that island. So that up to that period *S. cylindrica* was only known from the islands mentioned. But in 1855 a plant was received at Kew from Angola under the name of *Ifé*, which was found to be the same as one of which fibre was exhibited at the Paris Exhibition of 1855 under the mss. name of *Sansevieria angolensis*, Welw. This plant flowered and was figured for the *Botanical Magazine*. When, however, the plant of *S. cylindrica*, Boj., above alluded to, was received in 1858 from Mauritius, it was discovered to be identical with that from Angola. It is therefore probable that it was introduced by the Portuguese from Angola into Zanzibar or Mauritius, as the identity of the Angola and Mauritius plants seems to be beyond dispute, for on the back of the original drawing of plate 5093 of the *Botanical Magazine* the artist, Mr. W. Fitch, has written "*Sansevieria angolensis*. Hort. Kew, Aug. 58." From which it is certain that the drawing was made from the Angola plant, a descendant of which is still thriving at Kew, and this drawing and the living plant exactly agree with the figure made from the Mauritius plant published in the Revue Horticole by Carrière, whilst none of the allied species at all coincide with the latter figure, especially as to the stiffly erect leaves. The variety *patula* is also in cultivation under the names of *S. cylindrica* and *S. angolensis*, but may at once be distinguished from the typical form by the leaves being distinctly spreading from a curvature near the base, not straight and stiffly erect.

21. **S. Stuckyi,** *Godefroy-Lebeuf*, Les Sansevierias Gigantesques de l'Afr. Orient, pp. 13, 17 & 33 with fig., also fig. of habit as frontispiece and on the outside cover (Fig. 10). *Stemless*, with a stout creeping rootstock up to 2 in. thick. *Seedling plants* with a rosette of 4–6 leaves, spreading and recurved, thick and rigid, 4–6 in. long, $\frac{3}{4}$–$1\frac{1}{4}$ in. broad, $\frac{1}{8}$–$\frac{1}{3}$ in. thick, somewhat strap-

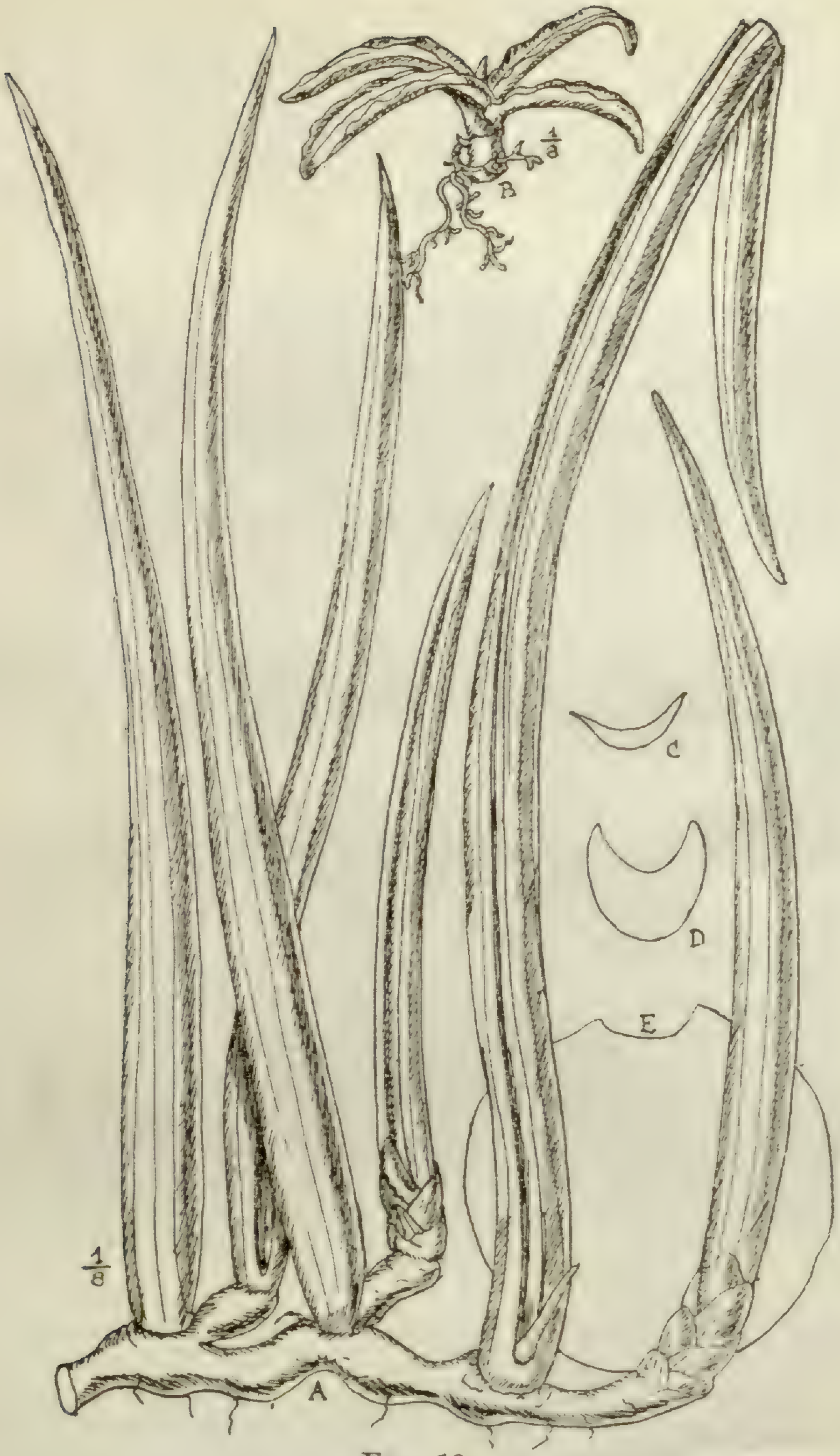


Fig. 10.

S. Stuckyi, *Godefr.-Leb.* A adult, and B seedling plants, $\frac{1}{8}$ nat. size; C and D, sections at middle of two different leaves of juvenile plants, $\frac{3}{4}$ nat. size; E, section 18 in. above base of adult leaf, $\frac{3}{4}$ nat. size. A, from a plant cultivated in Durban Botanic Garden, the remainder from plants cultivated at Kew.

shaped or narrowly oblong-lanceolate, acute, broadly channelled down the face, very rounded on the back, with more or less wavy hardened reddish-brown acute edges, dark green marked with narrow closely placed subparallel transverse bands of pale green. These leaves are succeeded by others that are ascending or suberect, rigid, $1\frac{1}{2}$–$2\frac{1}{2}$ ft. long, $\frac{1}{2}$–$\frac{7}{8}$ in. broad, and as much in thickness, sub-cylindric, with a broad concave channel extending

from base to apex, having acute edges, but with hardened red-brown margins at the apical part only, rather abruptly acute or tapering from 2–3 in. below the apex into a subulate point $\frac{1}{4}$–$\frac{3}{4}$ in. long, dark green, marked with subparallel transverse pale green bands $\frac{1}{8}$–$\frac{1}{2}$ in. apart.

Adult plants with 1-2 or rarely 3 leaves to a growth, stiffly erect, cylindric or nearly so, with a concave channel having acute green edges extending from the base quite to the apex on the face, nearly smooth or very slightly rough, 4-9 ft. long, $1\frac{1}{2}$–$2\frac{1}{2}$ in. in diameter at the base, gradually tapering to an acute hardened pale brown apex with a short stout subulate point; the larger leaves are as much as $1\frac{1}{4}$ in. in diameter at 1 ft. below the apex, and the channel is $\frac{1}{6}$–$\frac{1}{3}$ in. deep and $\frac{1}{4}$–$1\frac{1}{3}$ in. broad at the base, becoming $\frac{3}{8}$–$\frac{2}{3}$ in. broad near the apex; the sides and back are marked with 6–20 continuous or interrupted impressed dark longitudinal lines or slight grooves, and there are 2–5 in the channel, dull green, transversely and usually obliquely banded with paler green, slightly glaucous, the bands nearly or quite disappear with age. *Flowers* unknown.—Gérôme & Labroy in Bull. Mus. Hist. Nat. 1903, pp. 171–173, fig. 14; De Wildeman, Notices Pl. Utiles du Congo, pp. 623, 624, 625, fig. 14, and 632, with fig. & t. 31–32 (not t. 30). *S. Andradae* Godefroy-Lebeuf, Les Sansevierias Gigantesques de l'Afr. Orient, pp. 17 & 33, with fig. of a leaf-section. Gérôme & Labroy in Bull. Mus. Hist. Nat. 1903, pp. 171–173, fig. 15; De Wildeman, Notices Pl. Utiles du Congo, pp. 623, 624, 625 (fig. 15), & 633, with fig. *Sansevieria species*, Journ. d'Agric. Trop. 1901, p. 64.

Portuguese East Africa. Bena & Enhambara, according to Godefroy-Lebeuf, & Boror, according to *De Wildeman*.

Described from living plants, one of which is derived from the type. In the original place of publication only a very vague account of *S. Stuckyi* and *S. Andradae* is given; beyond stating that they came from Eastern Africa, there is no indication of their native country, and practically no description of either. Both are stated to have cylindric leaves 6 ft. and more long, chiefly differing in the number of slight grooves on the sides and back. These grooves, however, are not specific characters, they vary with the age of the leaf in many species: when young, none or few may be present, but as the leaf grows older slight shrinkage along certain lines takes place and more and more grooves are formed. I very much doubt if the two illustrations of *S. Stuckyi* given by Godefroy-Lebeuf (and repeated by De Wildeman) represent the same plant, that of the frontispiece (repeated by De Wildeman at t. 30) is evidently a plant with 8–12 leaves to a growth in two ranks, whilst that on the back of the cover (repeated by De Wildeman at t. 31) appears to me to represent about three growths, with 1–3 leaves to a growth and irregularly placed, not strictly 2-ranked. This latter agrees in habit with the plant I understand as *S. Stuckyi*, and with the Boror plant figured by De Wildeman in *Pl. Utiles de la Flore du Congo*, t. 32, but it never has nearly so many leaves to a growth nor so decidedly 2-ranked as represented on the plant of the frontispiece.

With regard to *S. Andradae*, I believe there is no difference

whatever between it and *S. Stuckyi*, the outlines of sections of leaves of the two supposed species given by Godefroy-Lebeuf are evidently very crude and inaccurate. All the difference they show in diameter, number of grooves, and form of the channel can, in many species, often be found in different leaves taken from the same growth. I have no hesitation whatever in considering them to belong to the same species.

Messrs. Gérôme & Labroy, when writing their account of Sansevieria, asked Mr. Godefroy-Lebeuf for information concerning *S. Stuckyi* and *S. Andradae*, and according to their statements in Bull. Mus. Hist. Nat., Paris, vol. ix, pp. 171, 175, they received from Mr. Godefroy-Lebeuf a portion of a leaf of *S. Stuckyi*, with the statement that it came from the region of Bena, and a piece of the rootstock of *S. Andradae*, without roots, buds or shoots, said to be from the region of Enhambara. The piece of leaf of *S. Stuckyi*, agreed with the larger sectional figure given by Godefroy-Lebeuf, and together with the piece of rootstock of *S. Andradae*, were sent to be propagated in the Jardin des Plantes. From them young plants were raised, one of which, raised from the leaf of *S. Stuckyi*, was sent to Kew, from which the juvenile state is above described. Plants raised from the rootstock of *S. Andradae* I have not seen.

In 1910 Mr. J. Medley Wood sent a living plant from Durban Botanic Garden, Natal, to Kew of what is evidently the adult state of *S. Stuckyi*, and exactly agreeing with the Boror plant figured by De Wildeman on t. 32 of the work above quoted. Mr. Wood informs me that the plant was sent to him in 1892 from Zanzibar by Dr. Murray, who was then residing there, with the information that the plant was one that had been discovered by Sir John Kirk, and that it has never flowered during the 18 years it has been in cultivation at Durban. De Wildeman (Pl. Utiles de la Flore du Congo, p. 623) states that *S. Stuckyi* and *S. Andradae* are natives of Abyssinia and Somaliland, but I can find no evidence of this being their native country, and believe that statement to be founded upon an error.

22. **S. singularis,** *N. E. Br.* in Kew Bulletin, 1911, p. 97. *Stemless. Rootstock* creeping, up to $1\frac{3}{4}$ in. thick. *Leaves* solitary, erect, rigid, slightly rough, $1\frac{1}{2}$–8 ft. long, $\frac{3}{4}$–$1\frac{3}{4}$ in. thick at the base, cylindric, slightly tapering upwards until near the apex, which shortly narrows to a stout acute whitish point, when young, with one concave channel $1\frac{1}{3}$–3 lin. broad and 1–$1\frac{1}{2}$ lin. deep down the face and 4–6 longitudinal impressed lines on the sides and back, which deepen into furrows with age, dull greyish- or bluish-green, often with a brownish tint or perhaps entirely brownish when mature, slightly subglaucous, rather brighter when young and then marked with numerous closely-placed transverse pale green bands, which nearly or quite disappear with age. *Flowers* unknown.

British East Africa. Rather common at Voi, growing in large clumps, *Powell*, 2! scarce at Mwatate, *Powell*, 10! by the river at mile 150–200 *Tomson*!

Described from living plants cultivated at Kew. In a letter dated Dec. 5, 1905, accompanied with a sketch, Mr. H. B. Dooner

states that this plant grows in a more or less sandy soil amongst thick scrub, and does not thrive in the open country; it never grows in swampy ground, and prefers a dry, fairly warm climate. This species is nearly allied to *S. Stuckyi*, but may readily be distinguished from that by the channel down the face of the leaves being only $1\frac{1}{2}$–3 lin. broad, by the old leaves having well-marked furrows on the sides and back, which are nearly as large as the channel down the face and much more evident than any I have seen on the old leaves of *S. Stuckyi*, also the greyish-green or brownish colour is quite distinct from the green of the leaves of *S. Stuckyi*.

23. **S. sulcata,** *Bojer* ex Baker in Journ. Linn, Soc., vol. xiv., p. 549, under *S. cylindrica*, Bojer. *Rootstock* creeping, $\frac{2}{3}$–1 in. thick, reddish. *Leaves* apparently solitary; in one specimen seen the leaf arises from the apex of a piece of rhizome 5 ins. long, surrounded at its base by 3–4 broadly ovate rather thin scale-leaves 1–$3\frac{1}{2}$ in. long, $1\frac{1}{4}$–$1\frac{1}{2}$ in. broad; the other two leaves seen are detached, erect, smooth, $1\frac{1}{2}$–2 ft. long, $\frac{2}{5}$–$\frac{3}{4}$ in. thick in dried specimens, probably much stouter when alive, cylindric, with 8–9 broadly-rounded ribs, separated by shallow furrows (scarcely or not discernible in dried specimens, except after boiling a very thin section in water), tapering near the apex to a hardened abruptly acute pale brown point about $\frac{1}{8}$ in. long. *Flower-stem* 5–9 in. high, stout, $\frac{1}{8}$–$\frac{1}{5}$ in. thick when dried, with 2–3 distant ovate sheaths or scales $\frac{1}{3}$–$\frac{1}{2}$ in. long on the basal half and a raceme of numerous flower-clusters at the upper half. *Bracts* $\frac{1}{10}$–$\frac{1}{8}$ in. long, ovate or ovate-lanceolate, acute, membranous, spreading or deflexed. *Flowers* 3–6 in a cluster; pedicels 1–$1\frac{1}{2}$ lin. long, jointed above the middle, with the persistent part $\frac{3}{4}$–1 lin. long; tube $\frac{3}{4}$ in., or rather more long, slender, in dried flowers (after boiling in water) $\frac{1}{2}$ lin. in diam. at the middle, slightly swollen and 5-ribbed at the base; lobes 7 lin. long, linear.—Baker in Kew Bulletin, May, 1887, p. 10, partly, as to Bojer's specimen only, not as to the figure and living plant, and not of the Flora of Tropical Africa, vol. vii. p. 335, which all belong to *S. canaliculata*, Carrière.

Tropical Africa. Eastern shore of South Africa, *Bojer*! Comoro Isles, Mayotte Island, sea shore at Pamanzi, *Boivin*, 3070!

As Bojer's Herbarium at Mauritius has been destroyed by fire, the only authentic specimen existing is the type in the Kew Herbarium. This consists of one detached leaf and a detached flower-stem without flowers, the rhizome is also absent. But these are so completely identical in all particulars with the leaves and flower-stems of Boivin's specimen in the Paris Herbarium that I think there can be no possible doubt that both specimens belong to one and the same species.

The description under *S. sulcata* in the Flora of Tropical Africa, vol. vii. p. 335, was made from a living plant of *S. canaliculata*, Carrière, which I believe originally formed part of the same specimen from which the description of *S. Schimperi*, Baker, was made, the two plants being quite identical.

24. **S. canaliculata,** *Carrière* in Rev. Hort., 1861, p. 449 (Fig. 11).—Rootstock creeping, rather slender, $\frac{2}{5}$–$\frac{1}{2}$ in. thick, light brown. *Leaves* solitary, or occasionally 2 together, sometimes

Fig. 11.

S. canaliculata, *Carrière.* Plant $\frac{1}{6}$ nat. size. A, section of leaf grown at Kew, nat. size. B, flower, nat. size.

arising from the rhizome close together one before another, sometimes at intervals of $\frac{1}{2}$–2 in. apart; erect, usually slightly curving, firmly flexible (not at all rigid), nearly or quite smooth, $\frac{1}{2}$–$2\frac{1}{2}$ ft. long, cylindric or slightly compressed, with 5–6 shallow longitudinal grooves and rounded rib-like spaces between them, 5–11 lin. thick, of nearly the same diameter up to near the apex, or slightly thicker along the middle part, shortly tapering near the apex into a hard whitish acute point; dark green, without markings. *Flower-stem* (in the only specimens seen), 2–$3\frac{1}{2}$ in. high, $\frac{1}{8}$–$\frac{1}{6}$ thick at the base, bearing 2–3 small ovate acute whitish-brown membranous sheaths on the lower half and a spike-

like raceme of flowers on the upper part. *Bracts* about $\frac{1}{6}$ in. long, ovate, acutely pointed, membranous. *Flowers*, 3 in a cluster at the lower part, solitary at the top of the raceme, or occasionally in weak specimens all solitary, suberect; pedicels $\frac{1}{2}$–$\frac{3}{4}$ lin. long, much shorter than the bracts, jointed at the apex to the flower, with no deciduous part; tube nearly or quite 1 in. long, slender, $\frac{2}{3}$ lin. in diam., slightly swollen at the base, white, tinged with green on the basal part; lobes $\frac{2}{3}$ in. long, linear, slightly broadening upwards, obtuse, white. *S. Schimperi*, Baker in Fl. Trop. Apr., vol. vii., p. 335. *S. sulcata*, Baker, in Kew Bulletin, May, 1887, p. 10, as to living plant and fig. 7 on p. 3; and Fl. Trop. Apr., vol. vii., p. 335. Godef.-Leb., Sansev. Gigant. Apr. Orient., p. 16; Gérôme & Labr. in Bull. Mus. Hist. Nat., 1903, pp. 169 and 173, fig. 17; De Wildeman, Notices Pl. Utiles du Congo, p. 624, fig. 17 and pp. 625, 631, with fig.; not of Bojer.

Somaliland. *Stace*! The country of the original plant is unknown, but it was sent from the Isle of Bourbon to the Paris Exhibition in 1855 and has since been cultivated in the Jardin des Plantes, Paris.

This very distinct species is easily recognised by its usually solitary leaves and insignificant inflorescence. Described from living plants, one of which was received from Paris Botanic Garden as being typical *S. canaliculata*, Car.; other plants of it have been cultivated at Kew for 40 years or more, and one is the type of *S. Schimperi*, Baker, which was sent by Lieut.-Col. E. V. Stace in June, 1892; it is still in cultivation at Kew, and differs in no way from typical *S. canaliculata*, but the specimen quoted under *S. Schimperi* in the Flora of Tropical Africa, vol. vii. p. 335, as sent from Somaliland by MacConkey, is quite a different plant, with tufted leaves, and to my personal knowledge is not the plant from which any part of the description of *S. Schimperi* was made, but, being supposed to be the same, the collector's name was merely added to the manuscript; the specimen, however, is too incomplete for identification.

25. **S. lanuginosa**, *Wild.* Sp. Pl. vol. ii p. 160.—*Stemless.* *Rootstock* creeping, stout, with a reddish skin. *Leaves* about 3–4 to a growth, $1\frac{1}{2}$–3 ft. long and apparently about 8–9 lin. broad and 3 lin. thick, rigidly erect, concavely semiterete, thick and fleshy, with a concave channel nearly or quite as broad as the leaf down the face and with several grooves down the back and sides, shortly sheathing at the base, tapering at the upper part to an acute point; green, with "woolly" (?) veins (grooves). *Flower-stem* about 2 ft. high, with 2–3 small ovate acute sheaths on the lower part and a raceme of flower-clusters at the upper part. *Bracts* neither described nor figured. *Flowers* 2–3 (according to description, but according to the figure 2–5) in a cluster: pedicels about 2 lin. long: tube (according to the figure) 4–5 lin. long, slightly inflated at the base; lobes 6–7 lin. long, white. *Berries* globose, or of 2–3 globose lobes, 1–3 seeded, pale green (ex Rhede, but perhaps immature. Sprengel, Syst. Veg. vol. ii. p. 93; Schultes, Syst. Veg. vol.

vii. p. 358; Kunth, Enum. Pl. vol. v. p. 19; Baker in Journ. Linn. Soc. vol. xiv. p. 549. *Aletris Zeylanica* var. B, Lam. Encycl. vol. i. p. 79. *Salmia ebracteata*, Cavanill. Ic. vol. iii. p. 24, under *S. spicata*. *Katu Kapel* seu *Cadenaco*, Rhede Hort. Malabar. vol. xi. p. 83, t. 42.

India. Malabar, in sandy places, *Rhede*.

Unknown to me. Described from Rhede's figure and description. It appears to be similar to *S. zeylanica*, Willd., but if the statement that the grooves on the leaves are woolly is correct, then it is perfectly distinct from all known species in the genus; but no indication of any woolliness is represented in the figure, and I very much doubt the accuracy of the statement. I suspect that this is the plant which Roxburgh has chiefly described in his *Pl. of the Coast of Coromandel*, vol. ii. p. 43, and in *Fl. Ind.* vol. ii. p. 161, as *S. zeylanica*, but it is certainly not the plant he has figured under that name, for which see *S. Roxburghiana*.

26. **S. Volkensii**, *Gürke* in Engl. Pflanzenwelt Ost-Afr. C. 144. *Stemless*, with a creeping rootstock. *Leaves* semiterete, channelled on the face, rounded on the back, rigid, gradually tapering to a sharply pointed apex; green, sometimes marked with transverse bands formed of whitish spots. *Flower-stem* shorter than or as long as the leaves. *Flowers* white.—Baker in Fl. Trop. Afr. vol. vii. p. 334.

German East Africa. Kilimanjaro; at Rombo, *Holst*, 4080. Crater-edge of Lake Chala Volcano, 3700 ft., *Volkens*, 1779.

27. **S. zeylanica,** *Willd.* Sp. Pl. vol. ii. p. 159, excluding all synonyms not quoted here (Fig. 12 c).—*Stemless*, with a creeping rootstock ½ in. thick. *Leaves* of adult plants 5–11 to a growth, erect at the lower part and slightly recurving above, nearly smooth, slightly shining, 1½–2½ ft. long, 4–10 lin. broad, 2½–4 lin. thick, measured from the bottom of the channel to the back; linear-semiterete, concave-channelled down the face, very rounded on the back, gradually tapering from the base to a very acute soft subulate green point ½–1½ in. long, which withers to whitish, very dark green, transversely banded throughout with rather lighter green, and with 4–7 darker green longitudinal lines on the back, which on withered leaves become slight furrows; margins green. *Flowers* not seen.—Willd., Enum. Pl. Hort. Berol, p. 375? (this may have been *S. aethiopica*); Haw. Synop. Pl. Succ. 66; Link, Enum. Pl. Hort. Berol. vol. i. p. 342; Sprengel, Syst. Veg. vol. ii. p. 94; Schultes, Syst. Veg. vol. vii. p. 357; Trimen, Handb. Fl. Ceylon vol. iv. p. 267, partly (excluding from the above references all synonyms not quoted here). *Aloe zeylanica pumila foliis variegatis*, Pluk. Almagest. Bot. p. 17, t. 256, fig. 5; and Commelin Hort. Med. Amstelodam, Rar. Pl. vol. ii. p. 41, t. 21. *Aloe hyacinthoides* var. *zeylanica*, Linn. Sp. Pl. ed. i. p. 321. *Aloe zeylanica*, Jacq. Enum. Stirp. Agro. Vindob. p. 310. *Aletris hyacinthoides* var. *zeylanica*, Linn. Sp. Pl. ed. ii. p. 456, and Mantissa ii. p. 367. *Aletris zeylanica*, Lam. Encycl. vol. i. p. 79, not of Miller.

Ceylon. Common in rocky or sandy places in the dry region, according to Trimen. Wild specimens were specially collected by Dr. J. C. Willis and sent alive to Kew for the purpose of this monograph in 1912. The native name for this plant in Ceylon is *Niyanda*.

It is remarkable that, although this species was one of the earliest to be described, yet it is one of the least known, or rather is practically an unknown plant to science, since in all modern descriptions, it is inextricably mixed up with the Indian *S. Roxburghiana* and *S. lanuginosa*, and the South African *S. aethiopica*. The confusion was began by Willdenow himself, who mixed up two other species with this; but as the name and description clearly point to the Ceylon plant as here understood and not to either of the South African species included under it by Willdenow, I think the specific name *zeylanica* should be exclusively applied to the Ceylon plant, which, with the exception of the living plants now at Kew, from which the above description has been made, does not appear to be anywhere in cultivation out of Ceylon, nor have I seen in any British or foreign Herbarium good dried specimens that I should unhesitatingly refer to the true Ceylonese plant. Such as I have examined bearing the name of *S. zeylanica*, belong either to *S. Roxburghiana*, *S. aethiopica*, or some other totally different species and are often from cultivated specimens, in no single instance have I seen a localised dried specimen from Ceylon. The description of *S. zeylanica* given in the Kew Bulletin for May, 1887, p. 8, belongs to *S. aethiopica*, and the figure on p. 4 to *S. Roxburghiana*, whilst the accounts of the fibre obtained from plants grown in India, Mauritius and Jamaica probably refer to those or some other species and not to the true Ceylon plant.

28. **S. Roxburghiana,** *Schultes* Syst. Veg. vol. vii. p. 357 (Fig. 12, d e).—*Stemless*, with a creeping rootstock. *Leaves* 6–24 to a growth, not 2-ranked, those of juvenile plants and sometimes the outer of the tuft spreading, smooth above, slightly rough beneath, 4–8 ins. long, 1–1½ ins. broad, flat, strap-shaped or narrowly lanceolate, usually abruptly rounded into a stout subulate point ¼–1 in. long; inner or adult leaves ascending and slightly recurving, somewhat stiff, mostly more than 1 ft., but varying from ⅔–2 ft. long ½–1 in. broad, 1½–2 lin. thick, linear, deeply concave-channelled down the face, rounded or very obtusely keeled on the back, gradually tapering into a stout subulate soft green point ¼–2 in. long, green, transversely marked with darker green rather regular bars on both sides and with 6–11 longitudinal dark green lines on the scarcely paler under-surface and often 1–3 on the upper; edges green, with age becoming very narrowly whitish. *Flower-stem* 1–2½ ft. high, with 4–5 erect acuminate sheaths 1–1½ in. long on the lower part and a spike-like raceme 1 1½ ft. long of flower-clusters above; bracts 1½–2 lin. long, lanceolate-attenuate, membranous. *Flowers* about four in a cluster; redicels 2½–4 lin. long, jointed near the middle, with the persistent part 1½–2 lin. long; tube 3 3½ lin. long; lobes 4 4½ lin. long, linear, obtuse; Kunth, Enum. Pl.,

vol. v. p. 18; Voigt, Hort. Suburb. Calcutt, p. 656; Baker in Journ. Linn. Soc., vol. xiv. p. 549; Hooker, Fl. Brit. Ind., vol. vi., p. 271; Gerome and Labroy in Bull. Mus. Hist. Nat, 1903, pp. 172-173, fig. 12; De Wildeman, Notices Pl. Utiles du Congo, pp. 624–625, fig. 12, and p. 631; *S. zeylanica*, Roxb. Pl. Corom., vol. ii. p. 43, t. 184, as to figure only, and Fl. Ind., vol. ii. p. 161, partly; Baker in Kew Bulletin, May, 1887, as to figure on p. 4 only, not as to the description; Gerome and Labroy in Bull. Mus. Hist. Nat. 1903, pp. 172-173, fig. 10; De Wildeman, Notices Pl. Utiles du Congo, pp. 624 625. fig. 10, not of p. 631; *Murva*, Asiatick Researches, vol. iv. p. 271.

India. Coast of Coromandel, Roxburgh; Madras (Triplicane), collector not stated! Goghat, in the Hoogli district, *Hossian*! Lower Bengal, at Ulubaria, *Kurz*! Palandu Tea Estate in Chota Nagpur, *Cooke*! Peninsula, *Rottler*! and cultivated specimens!

Described from living plants cultivated at Kew. The plant here described is unquestionably identical with that figured on t. 184 of Roxburgh's Plants of the Coast of Coromandel, but it does not agree with the description which Roxburgh has given, for in that description he has evidently mixed with it another plant that I think will probably prove to be *S. lanuginosa*, Willd., since he states that the leaves are 1 to 4 ft. long and semicylindric. Now Roxburgh's figure is an excellent one of the plant here described, but none of the adult flowering specimens of it that I have seen, either of those grown in India or of those cultivated at Kew, have leaves more than 2 ft. long, usually they are very much less, and none of them are semicylindric, the adult form being only crescent-shaped in transverse section. As Roxburgh's description has been more or less embodied in those of subsequent authors, this is the first to be published that is based on the plant alone.

Hitherto *S. Roxburghiana* has been more or less confused with *S. zeylanica*, but when seen growing by the side of that species, it can easily be discriminated, for its leaves are mostly shorter, much thinner and consequently less rigid than those of *S. zeylanica*, also of a rather lighter and different tint of green, with more numerous longitudinal dark green lines on the back. Possibly the flowers may also differ, but I have not seen those of *S. zeylanica*. The plant figured as *S. Roxburghiana* in the Botanical Magazine at t. 7487 is *S. burmanica*, which does not occur in the region where *S. Roxburghiana* grows.

29. **S. burmanica,** *N.E. Brown* (fig. 12).—*Stemless*, with a creeping rootstock $\frac{1}{3}$–$\frac{2}{3}$ in. thick. *Leaves* of adult plants 8-13 to a growth, smooth, $1\frac{1}{2}$–$2\frac{1}{2}$ ft. long, $\frac{1}{2}$–$1\frac{1}{4}$ in. broad, $1\frac{1}{2}$-2 lin. thick, very erect, straight and all close together, flexible, linear or linear-lanceolate, flattish or with a slight broad angular channel down the face, obtusely keeled on the back, tapering to a soft green subulate point 1–$3\frac{1}{2}$ in. long at the apex, sessile and sheathing at the base, grass-green, transversely banded with paler green, with 6–9 slightly impressed-lines down the back and 1–3 on the face; margins green, with age becoming very narrowly

FIG. 12.

S. burmanica, *N.E.Br.* Plant $\frac{1}{6}$ nat. size; A, section of leaf when first received at Kew, showing groove formed by shrivelling on the back; B, section of leaf on the same plant grown at Kew.
S. zeylanica, *Willd.* C, section of leaf grown at Kew.
S. Roxburghiana, *Schultes.* D and E, sections of two different leaves on the same plant, grown at Kew. Figs. A-E, nat. size.

whitish, not or scarcely shining. *Flower stem* 2–2½ ft. high, with about 3 sub-membranous whitish sheaths ½–1½ in. long on the basal third and a lax raceme of flower-clusters above. Bracts 1–2 lin. long, lanceolate, acute, membranous. *Flowers* 2–5 in a cluster; pedicels 3½–4 lin. long, jointed at the middle; tube about 4 lin. long; lobes about 4 lin. long, greenish-white. *S. Roxburghiana*, Hook f. in Bot. Mag. t, 7487, not of Schultes.

Upper Burma. Near Kyaukse, *Abdul Huk*! In the scrub forest around the village of Partar, two miles south-east of the town of Kyaukse, *H. Clayton*! Pyogingon, *Aubert & Gage*!

Described from living plants, dried flowers and a photograph sent to Kew by Mr. H. Clayton, Director of Agriculture, Burma, in September, 1912. It is nearly allied to *S. Roxburghiana* and *S. zeylanica*, but when alive the adult plant is readily distinguished from *S. zeylanica* by its much thinner and more flexible leaves, which are erect and straight, not recurving, with more numerous lines on the back at the middle part, as well as by the lighter green colour and less shining surface. From *S. Roxburghiana* it is easily distinguished in both the living and dried states by its much more erect and very straight leaves, which are also usually longer and more uniform in width for a greater part of their length.

30. **S. aethiopica,** *Thunb. Prodr. Pl.* Cap., p. 65 (excluding synonym).—*Stemless*, with a creeping rootstock. *Leaves* 13–30 to a growth, not 2-ranked, ascending-spreading, somewhat rough, 5–17 in. long, 5–7 lin. broad, about 1¾–2¾ lin. thick at the middle, linear or linear-lanceolate, sessile or only slightly narrowed to the base, gradually tapering from the middle to a subulate point ¾–1⅙ in. long, which, when young, is green, but very soon withers to white, very concave down the face, dark green with a somewhat bluish hue and more or less glaucous, sometimes transversely banded with paler green; margins red or whitish (drying red). *Flower-stem* 16–30 in. high, 3½–5 lin. thick at the base, with 5–7 whitish membranous sheaths ¾–2¾ in. long on the lower half, and a compact spike-like raceme of flower-clusters at the upper half. *Bracts* spreading or reflexed, 2½–5 lin. long, ovate-lanceolate, acute. *Flowers* 4–6 in a cluster; pedicels 2–4 lin. long, jointed above the middle; tube ¾–1 in. long; lobes 7–9 lin. long, white.—Thunb. Nov. Gen. 127, and Fl. Cap. ed. Schultes, p. 329; Schultes Syst. Veg., vol. vii. p. 358; Kunth Enum. Pl., vol. v. p. 19; N. E. Brown in Bot. Mag. t. 8487. *S. zeylanica*, Redoute Lil. vol. v. t. 290; Ait. Hort. Kew ed. 2, vol. ii. p. 278; Lindl. Bot. Reg. vol. ii. t. 160; Kunth. Enum. Pl., vol. v. p. 18; Baker in *Kew Bull.*, 1887, No. v. p. 3 & 8, fig. 5, not of p. 4; Hooker, Fl. Brit. India, vol. vi. p. 270; and Baker Fl. Cap., vol. vi. p. 5, not of Willdenow, excluding all synonyms except those quoted here. *S. glauca*, Gérôme & Labr. in Bull. Mus. Hist. Nat., 1903, pp. 169, 172–173, fig. 11, and De Wildem, Notices Pl. Utiles du Congo, pp. 624-625, fig. 11, not of Haworth. *Aletris zeylanica*, Mill Dict. ed. 8, No. iv. not of Lamarck. *A. hyacinthoides* var. *zeylanica*, Ait. Hort. Kew, ed. 1, vol. i. p. 464.

Tropical Africa. Rhodesia: near Bulawayo, *Mrs. Evelyn Cecil*. 103! Southern Rhodesia, *Allen*, 654!

South Africa. Griqualand West: Lower Campbell, *Burchell*, 1824! Transvaal: Shiluvane, *Junod*, 1212! South African Goldfields, *Baines!* Warmbath, *Miss Leendertz*, 2354! Graaf Reinet Div.: near Graaff Reinet *Bolus*, 720! Uitenhage Div.: Uitenhage, *Burchell*, 4420! Sandfontein, *Burke*! Alexandria Div.: Zuurberg Range, *Cooper*, 3267! Albany Div., *Cooper*, 3268!

According to Mr. Baines, in a note upon a drawing at Kew, the Bushmen and Bechuanas make their cord from the fibre of this plant. Described from living plants cultivated at Kew.

31. **S. grandiscuspis,** *Haw.* Synop. Pl. Succ. 67. *Stemless*, with a stout creeping rootstock. *Leaves* 5–15 in a tuft, erect, suberect or ascending-spreading, nearly straight, smooth, 7–20 in. long, $\frac{1}{2}$–$1\frac{1}{2}$ in. broad, $\frac{1}{10}$–$\frac{1}{8}$ in. thick at the middle, coriaceous, stiff, linear-lanceolate, with a very open angular or concave channel down the face or strap-shaped and flat or nearly so, shortly tapering or somewhat abruptly narrowed into a stout subulate somewhat flexible (not at all hardened) green point $\frac{2}{3}$–2 in. long, the broader and flatter leaves narrowed at the base but scarcely petiolate, and the narrower gradually tapering into a deeply channelled petiole 2–6 in. long, so that the distinction between blade and petiole is lost, somewhat regularly marked with transverse bars of dull dark and lighter green on both sides to the apex, with 5–7 longitudinal continuous or interrupted darker green impressed lines or slight furrows on the back; margins green, sometimes with age or injury becoming very narrowly whitish. *Flowers* not seen.—Sprengel, Syst Veg., vol. ii. p. 93; Schultes, Syst. Veg., vol. vii. p. 359; Kunth, Enum. Pl. vol. v. p. 20; Baker in Fl. Trop Afr., vol. vii. p. 336; Gérôme & Labroy in Bull. Mus. Hist. Nat., 1903, pp. 172–173, fig. 13; De Wildem. Notices Pl. Utiles du Congo, pp. 624–625, fig. 13. *S. ensifolia*, Haw. Synop. Pl. Succ., p. 66; Kunth Enum. Pl., vol. v. p. 20. *S. pumila*, Haw. Synop. Pl. Succ., p. 67; Link, Enum. Hort. Berol., vol. i. p. 342; Schultes, Syst. Veg., vol. vii. p. 359; Kunth, Enum. Pl., vol. v. p. 20.

Origin unknown.

Described from living plants that have long been in cultivation. Haworth originally described it in 1812 from a living plant, and *S. pumila* which he described at the same time, is evidently only the juvenile state of *S. grandicuspis*. *S. pumila*, De Spin., appears to have been quite a different plant.

32. **S. Dooneri,** *N. E. Brown* (fig. 13).—*Rootstock* creeping, $\frac{1}{4}$–$\frac{1}{3}$ in. thick, orange-brown, or, when above ground, dull olive-green, with broad whitish sheathing scales about $\frac{1}{2}$ in. long. *Stem*, none on some growths, but sometimes up to 2 in. high, concealed by the leaf-bases, and not very evident. *Leaves* on the barren growths up to 20, crowded on the short stem; on the flowering growths 6–8 in a lax rosette, coriaceous, flexible, very recurved-spreading from an erect or ascending basal part, very smooth, 4–17 in. long, $\frac{2}{3}$–$1\frac{1}{6}$ in. broad; strap-shaped or

Fig. 13.

S. Dooneri, *N.E.Br.* Plant $\frac{1}{6}$ nat. size. A, section at middle of a leaf; B, flower.

S. parva, *N.E.Br.* C and D, sections at middle of different leaves; E, section of petiole; F, flower. Figs. A–F, nat. size. From the type plants cultivated at Kew.

narrowly lanceolate, gradually narrowing downwards from near or above the middle to a scarcely petiolate base and more rapidly tapering upwards into a stout soft subulate green point $\frac{1}{4}$–2 in. long, flattish or but slightly concave down the face, dark green, slightly paler and without longitudinal lines beneath, very faintly and irregularly marked with transverse paler green bands on both sides; margins green, not hardened. *Flower-stem* 1–1$\frac{1}{4}$ ft. high, green, with a lax raceme of flower-clusters at the upper half, and on the lower part 4 membranous clasping sheaths $\frac{1}{2}$–$\frac{3}{4}$ in. long, tapering to an acute point. *Bracts* membranous, 1–2 lin. long, ovate-lanceolate, acute. *Flowers* 3, or near the top 2 in a cluster, ascending-spreading; dull pink or pale purplish outside, whitish within; pedicels 1$\frac{1}{2}$–2 lin. long, jointed to the shortly obconical base of the flower; tube about 5$\frac{1}{2}$ lin. long; lobes 5$\frac{1}{2}$–6 lin. long, linear, subobtuse.

British East Africa. Rift Valley, near the Kedong River, *Dooner*!

Described from living plants collected by Mr. H. B. Dooner and sent by Mr. W. G. Freeman in Aug., 1907, to Kew, where they flowered in March and May, 1910.

This is very similar to *S. parva*, but when both species are seen growing side by side *S. Dooneri* can at once be distinguished by its less evident stem and less erect habit, the leaves being

much more recurved; they have no very distinct petiole, and their subulate points are usually much shorter; also the colour is of a much darker and duller green, with very inconspicuous paler markings. In *S. parva* the green is rather bright and the paler bars quite conspicuous on the younger leaves.

33. **S. parva,** *N. E. Brown* (Fig. 13, C–F).—*Rootstock* creeping, $\frac{1}{3}$ in. thick, brownish-orange. *Stem* usually evident and often rising 1–5 in. above the ground, sometimes concealed by the leaf-bases. *Leaves* 6–14 to a growth, the inner ascending or suberect and slightly recurved-spreading at the upper part, smooth, 8–18 in. long, 4–7 lin. broad, the outer gradually shorter, more spreading and up to 14 lin. broad, all subfleshy or firmly coriaceous, not very flexible, linear or linear-lanceolate to lanceolate, concave or deeply channelled down the face or folded longitudinally, rounded or obtusely keeled on the back, tapering at the apex into a stout subulate soft green point, mostly $1\frac{1}{2}$–3 in. long, narrowed into a petiole up to 2 in. long, flat on the face and very rounded on the back, or sometimes only broadly clasping at the base, the younger marked on both sides with very distinct irregular transverse bands of dark bright green and paler green, becoming with age of a nearly uniform green or the markings very obscure; margins green, not hardened nor reddish. *Flower-stem* about 1 ft. high, scarcely $\frac{1}{8}$ in. thick at the base, smooth, light green, bearing a lax raceme of flower-clusters at the upper third, and on the lower two-thirds 3 membranous distant clasping sheaths $\frac{1}{2}$–1 in. long, tapering to a finely pointed apex. *Bracts* spreading, membranous, $\frac{1}{8}$–$\frac{1}{6}$ in. long, narrowly lanceolate, acute. *Flowers* in pairs or the upper solitary, ascending; pedicels 2–$2\frac{1}{2}$ lin. long, jointed above the middle, the upper or deciduous part being thickened upwards; tube 5–$5\frac{1}{2}$ lin. long, $\frac{3}{4}$ lin. in diameter, swollen at the base, pale pinkish-white; lobes 4–$4\frac{1}{2}$ lin. long, linear obtuse, more or less tinted with mauve within, dull mauve or purplish on the back.

British East Africa. Near the Gilgil River, scarce, *Powell* 15. Uganda: Semliki Valley, *Dawe*, 687.

Described from living plants sent by Mr. H. Powell in 1906 to Kew, where it flowered in January, 1910. The flowers open in the morning and close between 1 and 2 p.m.

34. **S. concinna,** *N. E. Brown* (Fig. 14).—*Stemless. Rootstock* creeping, about $\frac{1}{3}$ in. thick. *Leaves*, about 5 to a growth, ascending-spreading and slightly recurving, coriaceous, smooth, 6–10 in. long, $\frac{1}{2}$–$1\frac{1}{4}$ in. broad, narrowly lanceolate, acute, with a green subulate point 2–4 lin. long, shortly narrowing at the base into a channelled petiole $1\frac{1}{2}$–$3\frac{1}{2}$ in. long and 2–3 lin. broad; blade apparently somewhat folded longitudinally, with the margins green and scarcely hardened, apparently transversely banded on both sides with pale green and the bands much broader on the upper surface than on the lower, but on dried specimens often entirely obliterated on both sides. *Flower-stem* $\frac{1}{2}$–1 ft. high, with a compact raceme of flowers on the upper half and 4 lanceolate acuminate sheaths 1–$1\frac{1}{4}$ in. long on the lower half. apparently tinged and dotted with purple. *Bracts* spreading

Fig. 14.

S. concinna, *N.E.Br.* Plant $\frac{1}{6}$ nat. size. A, flower, nat. size. From a dried specimen.

$\frac{1}{4}$–$\frac{1}{3}$ in. long, lanceolate, acuminate, membranous. *Flowers* in pairs or a few of them solitary; pedicels jointed close under the flower, with the persistent part $1\frac{1}{2}$–2 lin. long; tube $1\frac{3}{4}$ in. long, about 1 lin. in diam., cylindric, swollen at the base; lobes 10 lin. long, linear, 1 lin. broad near the apex, slightly tapering to the base, white.

Portuguese East Africa. Near Beira, *Dawe*, 1!

35. **S. subspicata**, *Baker* in Gard. Chron. 1889, vol. vi. p. 436 (Fig. 15).—*Stemless*, with a creeping rootstock, $\frac{1}{2}$–1 in. thick, pale yellowish brown. *Leaves*, 4–8 (up to 10 ex *Baker*) in a tuft, coriaceous, rather flexible, or somewhat firm, erect or recurved-spreading, smooth, $\frac{3}{4}$–2 ft. long, 1–$2\frac{1}{4}$ in. broad, 1 lin. or less thick at the middle of the blade, lanceolate or narrowly lanceolate, acute, with a subulate soft green (withering to white) point $\frac{1}{6}$–$\frac{1}{4}$ in. long, mostly tapering from the middle or above into a comparatively slender petiole $1\frac{1}{2}$–9 in. long and 2–3 lin. broad and thick and concave-chanelled down the face; deep green, slightly shining, sometimes very faintly glaucous with age; when young sometimes obscurely marked with transverse paler green bars, which soon disappear; edges of young leaves green, of old ones (apparently from rubbing or damage) very narrowly whitish. *Flower-stem* 12–16 in. high, $\frac{1}{6}$–$\frac{1}{4}$ in. thick, with 3–4 membranous distant lanceolate-attenuate bracts $\frac{1}{3}$–$\frac{3}{4}$ in. long on the basal half, and a spike-like raceme above. *Bracts* 1–3 lin. long, lanceolate, acute, membranous. *Flowers* solitary or in pairs, white; pedicels $\frac{1}{2}$–1 lin. long, articulated close under the

Fig. 15.

S. subspicata, *Baker*. Plant $\frac{1}{6}$ nat. size. A–D, sections of petioles of four different leaves; E and F, sections at middle of two different leaves; G, flower. Figs. A–G, nat. size. From the type cultivated at Kew.

base of the flower, with no deciduous part; tube 11–14 lin. long, greenish-white; lobes $\frac{2}{3}$–$\frac{3}{4}$ in. long, linear, obtuse, revolute.—Baker in Flora Capensis, vol. vi. p. 5.

South Africa. Delagoa Bay (cultivated specimens), *Mrs. Monteiro*!

Described from the type plant, still in cultivation at Kew, originally sent from Delagoa Bay by Mrs. Monteiro in 1866.

36. **S. senegambica,** *Baker* in Journ. Linn. Soc., vol. xiv. p. 548 (Fig. 16). *Stemless*, with a creeping rootstock $\frac{1}{2}$–$\frac{3}{4}$ in. thick, bright red, changing to very pale brownish where exposed to the light. *Leaves* 3–4 to a growth, coriaceous, smooth, 1–$2\frac{1}{4}$ ft. long, $1\frac{1}{6}$–$2\frac{1}{2}$ in. broad, 1–$2\frac{1}{2}$ lin. thick at the middle, suberect at the basal third or half, then recurved-spreading, linear-lanceolate to lanceolate, gradually tapering from the middle upwards into an acute subulate soft green point $\frac{1}{6}$–$\frac{1}{2}$ in. long, and downwards into a stout, flattened concave-channelled petiole 1–3 in. long, or, in juvenile forms, scarcely petiolate, concave to almost flat, scarcely or not at all wavy; upper surface entirely dark green or somewhat indistinctly marked with transverse bars of paler green, under surface slightly paler than the upper, with the transverse bars much more distinct, but often becoming nearly obliterated with age; margins green, like the rest of the leaf, not becoming whitish or reddish. *Flower-stem* 12–20 in.

high, 2–2½ lin. thick at the base, light or dark green or mottled with purplish, according to intensity of light, not glaucous; the lower half with 4–5 distant sheaths, of which the lower are 1¼–2½ in. long, stem-clasping at the base with a long slender awl-like free point, and the upper ⅓-1 in. long, ovate, acute, stem-clasping, white or tinted with reddish-brown; upper half with a spike-like lax raceme of flower-clusters, which sometimes are grouped 2–3 together. *Bracts* spreading, 3–4 lin. long, 1–1½ lin. broad, ovate-lanceolate or oblong-lanceolate, acute, membranous, white. *Flowers* 3–6 in a cluster, white, tinged with purple where exposed

Fig. 16.

S. senegambica, *Baker.* Plant ⅙ nat. size. A and C, sections of petioles; B and D sections at middle of blades of two different leaves; E, flower. Figs. A–E, nat. size. From a plant cultivated at Kew.

to the sun; pedicels 2½–4 lin. long, jointed at or below the middle, with the upper or deciduous part 1¾–3 long; tube varying from ¼–½ in. in length on different specimens of the same plant, ⅔–1 lin. in diam. at the slightly swollen ellipsoid base, ½–⅔ lin. in diam. above; lobes 5–9 lin. long, linear, obtuse, revolute.—Baker in Fl. Trop. Afr., vol. vii. p. 332. *S. Cornui*, Gér. & Labr. in Bull. Mus. Hist. Nat. Paris, 1903, p. 170, 173, fig. 5; De Wildem. Notices Pl. Utiles du Congo, pp. 624–625, fig. 5.

Senegambia. Richardtol, *Richard*, 72! and without precise locality, *Perrottet*, 782! and 76 ex Baker, also cultivated specimens!

Described from a living plant, a portion of the type of *S. Cornui*, received from Paris Botanic Garden in 1903, which first flowered at Kew in 1905. *S. Cornui*, Gér. & Labr. is absolutely identical with the type of *S. senegambica*, Baker.

37. **S. subtilis,** *N.E. Brown* (Fig. 17). *Stemless*, with a creeping rootstock 4–5 lin. thick. *Leaves* 2–4 to a growth, erect or slightly recurving, very flexible, smooth, $1\frac{3}{4}$–$2\frac{1}{4}$ ft. long, 1–$1\frac{3}{4}$

Fig. 17.

S. subtilis, *N.E.Br.* Plant $\frac{1}{6}$ nat. size. A, section at middle of leaf, nat. size; B, flower, nat. size. From the type cultivated at Kew.

in. broad, $1\frac{1}{4}$ lin. thick at the midrib, linear-lanceolate, gradually tapering from the middle or above upwards into a subulate soft green point $\frac{1}{2}$–1 in. long and downwards into a channelled petiole 2–12 in. long, uniformly green and shining on both sides, or with here and there a very faint trace of transverse banding on the under surface; margins green, not hardened. *Flower-stem* 15–21 in. high, rather slender, 2 lin. thick at the base, the lower half bearing about 3-distant membranous acuminate sheaths 5–6 lin. long and the upper a lax raceme of flower-clusters. *Bracts*

membranous, $1\frac{1}{2}$–2 lin. long, lanceolate, acuminate. *Flowers* 2–3 in each cluster; pedicels 2–$3\frac{1}{2}$ lin. long, articulated at about the middle, with the persistent part 1–2 lin. long and the deciduous part 1–$1\frac{1}{2}$ lin. long; tube 3–4 lin. long, slender, 1 lin. in diam. at the slightly enlarged but not distinctly inflated base; lobes 5–6 lin. long, $\frac{3}{4}$ lin. broad, linear, obtuse, white, recurved or somewhat revolute.

Tropical Africa. Uganda; without precise locality, *Dawe*!

Described from a living plant sent from Uganda by Mr. M. T. Dawe to Kew. This and *S. nilotica* var. *obscura* were received at the same time, without information, and are so very similar in foliage that they were supposed to belong to one species and were planted together in the same pot. When, however, they both flowered at the same time on June 4th, 1913, it was at once seen that they are certainly quite distinct in their flowers, and after separating the two plants it was noted that they can be distinguished by the foliage of *S. subtilis* being uniformly green on both sides, with scarcely a trace of markings and having a shining surface, whilst *S. nilotica* var. *obscura* has indistinct transverse bars and a dull surface to its leaves.

38. **S. nilotica,** *Baker* in Journ. Linn. Soc., vol. xiv. p. 548. *Stemless*, with a creeping rootstock about $\frac{3}{4}$ in. thick. *Leaves* 2–3 to a growth, smooth, adult forms (including the petiole) 3–4 ft. long, 1–$2\frac{1}{4}$ in. broad, strap-shaped, with the sides for a foot or more of the central part quite parallel, narrowing at the apical part into a soft green subulate point $\frac{1}{6}$–$\frac{2}{3}$ in. long and gradually tapering at the basal point into a deeply concave-channelled petiole 1–2 ft. long, conspicuously marked with very numerous closely placed irregular zigzag transverse narrow bars of dark green and paler green; margins green. *Flower-stem* $1\frac{3}{4}$–$2\frac{1}{2}$ ft. high, of which 1–$1\frac{1}{2}$ ft. is occupied by a lax raceme of irregularly scattered flower-clusters, and on the lower part are about 5 clasping sheaths, of which the lower are about 3 in. long and taper into a long subulate point, the upper $\frac{2}{3}$–$1\frac{1}{4}$ in. long, ovate-lanceolate, acute. *Bracts* spreading, 2–5 lin. long, narrowly lanceolate, acute, membranous. *Flowers* 4–10 in the lower and 2–3 in the upper clusters; pedicels $3\frac{1}{2}$–6 lin. long, jointed above the middle, with the persistent part 2–5 lin. long; tube $4\frac{1}{2}$–5 lin. long; lobes $5\frac{1}{2}$–6 lin. long, linear, subacute, white.—Gürke in Engler, Pfl. Ost-Afr. B, p. 367, t. 5, fig. J; Baker in Fl. Trop. Afr. vol. vii. p. 332.

Tropical Africa. Muro or Moru Territory: in woods near the river bank at Wayo, *Murie*! Mittu Territory: at Mvolo, near the Bahr el Rohl, *Schweinfurth*, 3834! Ruwenzori, *Scott Elliot*!

Described from dried specimens. The type is stated by Mr. Baker to have been collected by Petherick, but this is an error; it was collected by Dr. J. Murie, formerly assistant secretary to the Linnean Society, but was forwarded to Kew, with others collected by Dr. Murie, by Mr. J. Peterick, when acting as Consul in Central Africa.

Var. **obscura**, *N. E. Br.*—*Leaves*, 4-5 to a growth, erect,

flexible, smooth, 2–2¾ ft. long (including the petiole), 1½–2¾ in. broad, very narrowly lanceolate or strap-shaped, tapering near the apex into a soft green subulate point ½–1¼ in. long and below into a deeply concave-channelled petiole ½–1 ft. long, opaque (not at all shining) grass-green, with or without a few inconspicuous transverse bars of slightly paler green 1–1½ in. apart; margins green. *Flower-stem* 2–3 ft. long, 2½–3 lin. thick at the base, dull mottled green, with a raceme of flower-clusters on the upper part and 3 submembranous acuminate sheaths ½–1 in. long on the lower part. *Bracts* 2–4 lin. long, ovate-lanceolate, acute or acuminate, membranous, spreading. *Flowers* 3–6 in a cluster; pedicels jointed above the middle, with the persistent part dusky or dull purplish, 1¾–2¼ lin. long and the deciduous part much paler and greenish, 1–1¼ lin. long; tube 4 lin. long, 1 lin. in diam. at the very slightly enlarged base, dingy greenish-white, marked with 6 longitudinal lines of dull purplish; lobes 7 lin. long, rather more than 1 lin. broad, linear, obtuse, very revolute, whitish, with a purplish stripe on the back of each, very shining.

Tropical Africa. Uganda, without precise locality, *Dawe*!

Described from a living plant sent by Mr. M. T. Dawe from Uganda to Kew, where it flowered in June, 1913.

This variety may prove to be specifically distinct from *S. nilotica*, when living plants of both can be compared side by side. Dried specimens of *S. nilotica* differ in having longer leaves, more gradually tapering at the apex, and are very distinctly marked with rather crowded and very zigzag transverse bars, whilst in the living plant of var. *obscura* the transverse paler bars are indistinct and distant. See also a note under *S. subtilis*.

39. **S. trifasciata**, *Prain*. Bengal Plants, vol. ii. p. 1054 (1903).—*Stemless*, with a creeping rootstock ½–1 in. thick. *Leaves* often 1–2, but in vigorous plants 2–6 to a growth, smooth, 1–4 ft. long, 1–2¾ in. broad, very erect, straight, stiff or firmly coriaceous, linear-lanceolate or narrowly elongated-lanceolate, acute, with a stout green (not hardened) subulate point ⅛–1½ in. long, gradually narrowing from above or about the middle into a concave-channelled petiole very variable in length, transversely banded on both sides from base to apex with very distinct light dull green or clear whitish-green and deep grass-green to almost blackish-green, finally overspread with a slight glaucous bloom; margins green, mostly without, but sometimes with narrow cartilaginous edges. *Flower-stem* 1–2½ ft. high, 1½–4 lin. thick, green, dotted with paler green, with 3–4 attenuate acute whitish or very pale brownish membranous sheaths ½–2¼ in. long on the basal part and a lax raceme of flower-clusters above. *Flower-clusters* solitary or in scattered groups of 2–3 from ¼–1½ in. apart. *Bracts* ⅛–½ in. long, ovate or ovate-lanceolate, acuminate, membranous, spreading. *Flowers*, 3–8 in a cluster, pale greenish or greenish-white; pedicels 2½–4 lin. long, jointed at or just above the middle, with the persistent part 1–2 lin. long; tube 3–6 lin. long; lobes 7–9 lin. long, linear,

obtuse. *Berry* globose, about $\frac{1}{3}$ in. in diam., bright orange, 1-seeded, with 2 cells aborted in the specimens seen.—Prain in Records of the Botanical Survey of India, vol. iii. p. 287, and Contributions to Indian Botany, p. 339. *S. guineensis*, Gérôme & Labroy in Bull. Mus. Hist. Nat. Paris, 1903, pp. 172–173, fig. 1; De Wildem. Mission E. Laurent, p. clvi., with fig., and Notices Pl. Utiles du Congo, pp. 624–625, f. 1, not of p. 629 nor of Willdenow. *S. zebrina*, Gentil, Liste Pl. Cult. Jard. Bot. Brux, 1907, p. 172, name only. *S. Jacquinii*, N. E. Brown in *Kew Bulletin*, 1911, p. 97. *Aloe guineensis*, Jacq. Enum. Stirp. Agro Vindobon, 308, not of Linnaeus. *Aletris hyacinthoides*, Miller, Dict. ed. 8, No. 3, not of Linnaeus. *Aletris guineensis*, Jacq. Hort. Vindobon, vol. i. p. 36, t. 84; Lamarck, Encycl. Meth. vol. i. p. 79. *Acyntha guineensis*, Medik., Theodora Speciosa, p. 76. *Salmia guineensis*, Cavanilles, Icon. vol. iii. p. 24. *Pleomele aloifolia*, Salish. Prodr. p. 245.

West Tropical Africa. Southern Nigeria; Oban district, *Talbot*! and cultivated specimens!

Var. **Laurentii**, *N. E. Brown*.—Leaves longitudinally striped with golden yellow, otherwise exactly as in the type.—*S. Laurentii*, De. Willdem. in Rev. Cult. Colon., 1904, vol. xiv. p. 231; Mission E. Laurent, p. 45, fig. 9–10, and Notices Pl. Utiles du Congo, p. 628; Gentil in Rev. Hort. Belg., 1904, vol. xxx. p. 169, with plate; Gard. Chron., 1909, vol. xlv. p. 347.

West Tropical Africa. Belgian Congo, cultivated plants, discovered near Stanleyville and introduced into cultivation by *Emile Laurent*.

Both the type and the variety are described from living plants cultivated at Kew. When I published the name *S. Jacquinii*, I believed that the plant figured by Jacquin might be distinct from that here described, on account of the flowers being figured as nearly sessile and having a longer tube, but I now feel convinced that his figure is not correct as to these details and that it is the same plant as *S. trifasciata*. The name *S. zebrina* is published without a description, but a living specimen of it having been kindly sent to Kew by Monsieur L. Gentil, its identity with *S. trifasciata* is certain.

The typical form of this species has been in cultivation for over 150 years, and during the greater part of that period has been confused with *S. guineensis;* but it is utterly different from the plant figured and described by Commelin, upon which that name is founded, and is also one of the most distinct and easily recognised of the genus.

The more recently introduced variety *Laurentii* is a rather remarkable plant. Not so much on account of its beautifully variegated foliage, but because that variegation is not reproduced in plants raised from leaf-cuttings. At least all efforts made at Kew to propagate the variegation from cuttings of the variegated leaves have resulted in failure, as all the plants so raised have reverted to the typical form, without a trace of the yellow striping. Even plants that have originated directly from the yellow part of a leaf-cutting have no trace of the yellow in them, so that it would appear the power to produce the yellow

variegation resides entirely in the rootstock, as cuttings of the latter always reproduce the variegated plant.

40. **S. fasciata**, *Cornu* ex *Gérôme and Labroy* in Bull. Mus. Hist. Nat. Paris, 1903, pp. 170, 172, 173, fig. 3.—*Stemless*, with thick creeping rootstock and crowded leaf-tufts. *Leaves* frequently 2 (sometimes 3–5) in a tuft, with the basal half erect and the upper part recurved-spreading or sometimes drooping, coriaceous, but rather flexible, smooth, $1\frac{1}{4}$–$2\frac{3}{4}$ ft. long, $1\frac{1}{2}$–$4\frac{1}{2}$ in. broad, $\frac{1}{6}$ in. thick at the middle of the blade, lanceolate, acute, with a green point 1–3-lin. long, withering to whitish at the tip, tapering from about the middle into a stout concave-channelled petiole, pale green above, whitish-green beneath, very distinctly marked on both sides with irregular narrow zig-zag transverse dark green bands; on the upper surface the pale green areas are more or less interrupted or broken up into irregular spots and longitudinally traversed by dark green lines; beneath the colouring is much brighter, with fewer and more distant dark green bands not so much broken up into spots nor traversed by dark green lines; margins at first green, finally very narrowly whitish or reddish, with age sometimes decomposing into very fine fibres. *Flowers* not seen. De Wildem. Notices Pl. Utiles du Congo, pp. 624–625, fig. 3. *S. lasciata*, Gentil, Liste Pl. Cult. Jard. Bot. Brux., 1907, p. 172.

Congo Free State. Sent to Paris Botanic Garden from the Congo region by Dybowski in 1891 and by Lecomte in 1894.

Described from a portion of the type plant cultivated at Kew, originally received from Paris Botanic Garden in 1903. This species appears to be closely allied to *S. bracteata*, Baker; its leaves are very similar in their very pronounced variegation, but the hardened margin is only half as broad as in that species. I think it probable that specimens distributed by A. S. Curtiss, No. 112, under the name of *S. guineensis*, Willd., belong to this species; it is stated to be common along roadsides near Nassau, in the Bahamas, where it is introduced.

41. **S. abyssinica**, *N. E. Brown* in Kew Bull., 1913, p. 306.—*Rootstock* creeping, $\frac{3}{4}$ in. or more thick. *Leaves*, 1–2 to a growth in the specimens seen, apparently erect, firm or subrigid, rough, with fine transverse rugosities on both sides, but more distinctly beneath, 2 ft. or rather more in length, $2\frac{1}{2}$–3 in. broad, lanceolate, acute, with a hardened brown apical point 1 lin. (or more?) long, tapering from the middle into a stout concave-channelled petiole $\frac{1}{5}$–$\frac{1}{3}$ as long as the blade, wavy along the margins, with hardened reddish-brown edges $\frac{1}{2}$ lin. broad, apparently green, without markings on either side, or the markings obliterated in drying. *Flower-stem* $2\frac{1}{4}$–$2\frac{1}{2}$ ft. high, $\frac{1}{4}$ in. or more thick at the base, with 5–6 ovate-lanceolate acute or acuminate distant sheaths on the lower half and a spike-like raceme of flower-clusters occupying the upper half. *Bracts* and flowers not seen, the specimen being in fruit. *Flowers* 4–5 in a cluster, or fewer in the upper clusters; pedicels in fruit 3–4 lin. long, jointed at the middle, with the persistent part 1–2 lin. long.

Berries 1–3-seeded, $\frac{1}{4}$–$\frac{1}{2}$ in. in diam. in the dried state, apparently green, but perhaps not ripe.

Abyssinia. On mountains near Dschana (Jana), 4000–5000 ft. *Schimper*, 1468.

Described from a dried specimen in the Paris Herbarium. According to Schimper's note with the specimens, this plant is known to the natives of various tribes as *Bisca*, *Besca* and *Eggua*. Its fibre is used for making ropes.

Probably the following specimens (*S. guineensis*, Schweinfurth in Bull. Herb. Boiss. vol. ii, Append. 2, p. 79; Pirotta, Flor. Col. Eritrea, p. 253, and Fiore, Boschi e Piante Legn. Eritrea, p. 104, not of Willdenow) also belong to this species:—Eritrea, Plain of Keren, *Steudner*, 475; Mai Golgol, *Schweinfurth and Riva*, 1270; Mogod Valley, *Schweinfurth and Riva*, 1609; near Acrur, *Schweinfurth and Riva*, 1763, but the material I have seen is too imperfect for proper indentification. Schweinfurth also quotes his No. 1835 for this plant, but at Kew this belongs to *S. Ehrenbergii*.

42. **S. chinensis,** *Gentil*, Liste Pl. Cult. Jard. Bot. Brux. 1907, p. 171, name only (fig. 18). *Stemless*, with creeping root-stock, 1–1$\frac{1}{4}$ in. thick. *Leaves* 3–6 to a growth, erect or ascending-spreading, nearly straight or slightly recurving, rigidly coriaceous, nearly smooth, 1$\frac{1}{2}$–2$\frac{1}{4}$ ft. long, 1$\frac{1}{4}$–4 in. broad, varying from nearly strap-shaped to lanceolate, acute, with a subulate pale brownish or whitish and rather soft point, 2–6 lin. long, narrowing from above or below the middle into a concave-channelled petiole 2–7 in. long, wavy, with reddish-brown or whitish margins, sometimes having a broader membranous edge, which nearly or quite disappears with age, both sides about equally marked with transverse dark green and lighter green bands, slightly or distinctly glaucous, with the under-surface scarcely paler than the upper, not marked with longitudinal lines on either side. *Flower-stem* 2–2$\frac{3}{4}$ ft. high, light green, without spots; the lower part about $\frac{1}{3}$ in. thick with 5 membranous sheaths $\frac{3}{4}$–3$\frac{1}{2}$ in. long, gradually tapering from the base to an acute point; the upper part a rather compact raceme 1–1$\frac{1}{4}$ ft. long and 4–4$\frac{1}{4}$ in. broad. *Bracts* 3–4 lin. long, linear-lanceolate, acute, white and membranous, or at first with a green central stripe. *Flowers* 2–3 in a cluster, and sometimes 2 or 3 clusters crowded together, so that each cluster may appear to be 6–8-flowered; pale greenish-white; pedicels 2$\frac{1}{2}$–3$\frac{1}{2}$ lin. long, jointed at the middle, with the persistent part 1$\frac{1}{2}$–2 lin. long; tube 1 in. long, 1 lin. in diam., slightly inflated at the base; lobes 10–12 lin. long, linear, obtuse, spreading and more or less revolute.

Origin unknown. Cultivated plant.

Described from a portion of the type, sent from Brussels Botanic Garden by Monsieur L. Gentil in 1909 to Kew, where it flowered June 1st, 1910. Monsieur Gentil informs me that he received it from some other garden under the name of *S. chinensis*, which he suggests is a gardener's corruption of *S. guineensis*, a name indiscriminately applied to several species in cultivation.

Fig. 18.

S. chinensis, *Gentil.* Plant $\frac{1}{6}$ nat. size. A, section of petiole; B, section of blade of leaf; C, flower. From part of the type plant cultivated at Kew. Figs. A–C nat. size.

43. **S. conspicua,** *N. E. Brown* in Kew Bull. 1913, p. 306 (Fig. 19). *Stemless*, with a creeping reddish or purplish-red rootstock $\frac{2}{3}$–$\frac{3}{4}$ in. thick. *Leaves* 3–5 to a growth, ascending-spreading, smooth, $\frac{3}{4}$–$2\frac{1}{2}$ ft. long, 2–$3\frac{1}{4}$ (mostly 3) in. broad, $\frac{1}{12}$ in. thick at the middle, lanceolate or elongated lanceolate, acute, with a hardened point $\frac{1}{12}$–$\frac{1}{8}$ in. long at the apex, narrowed from below the middle to the base, where the leaves embrace one another, not forming a distinct petiole, often slightly twisted, more or less wavy along the sides, with hardened brownish-red margins $\frac{1}{5}$ lin. broad, narrowly edged with white; dull green on both sides, but somewhat darker above, with numerous inter-

rupted longitudinal lines of darker green from base to apex; beneath, with a few longitudinal lines at the base only and faintly marked when young with irregular transverse rows of blotches or broken bands of paler green, which disappear with age. *Flower-stem* 12–20 in. high, $\frac{1}{3}$ in. thick, greyish-green, suffused with dull purple and marked with minute paler specks; basal part with 4–5 distant sub-membranous pale brownish sheaths $1\frac{1}{4}$–$3\frac{1}{2}$ in. long, gradually tapering from the base to a very acute point; upper part with a rather compact spike-like

FIG. 19.

S. conspicua, *N.E.Br.* Plant $\frac{1}{6}$ nat. size. A, section of petiole; B, section at middle of leaf blade; C, flower. From a plant cultivated at Kew. Figs. A–C nat. size.

raceme 10–12 in. long. *Bracts* membranous $\frac{1}{4}$–$\frac{1}{2}$ in. long, linear-lanceolate, subacute, reflexed. *Flowers* 3 in the lower and 1–2 in the upper clusters; pedicels 2–3 (when dried 1–$2\frac{1}{2}$) lin. long, articulated close to the base of the perianth, with no deciduous part; tube $1\frac{1}{2}$–$1\frac{2}{3}$ in. long, rather slender, about $\frac{1}{16}$ in. diam., but swollen and about $\frac{1}{6}$ in. in diam. at the base, greenish-white; lobes 1–$1\frac{1}{4}$ in. long, linear, obtuse, revolute, white.

BRITISH EAST AFRICA. Near Mazeras, scarce, *Powell*, 12!

Described from a living plant sent in 1906 by Mr. H. Powell to the Royal Botanic Gardens, Kew, where it flowered on Sept. 10, 1909. Specimens in the Paris Herbarium, collected near the sea-shore of Zanzibar (this may mean the cost of German East Africa and not the island of Zanzibar) by *Sacleux* (No. 1497), may possibly belong to this species.

44. **S. metallica,** *Gér. & Labr.* in Bull. Mus. Hist. Nat. Paris, 1903, pp. 170, 173, fig. 2. *Stemless*, with a creeping rootstock $\frac{3}{4}$–1 in. thick, of a rather bright red, changing to pale brown when dry or exposed to the light. *Leaves* of adult plants 1–3 (very rarely 4) to a growth, erect or with the upper part more or less spreading or recurved, firmly coriaceous, smooth, $1\frac{1}{2}$–5 ft. long, 2–5 in. broad, 1–2 lin. thick at the middle, elongated lanceolate or broadly strap-shaped, acute, with a soft subulate green point $1\frac{1}{2}$–3 lin. long at the apex, tapering downwards from about the middle into a deeply channelled petiole $\frac{1}{3}$–2 ft. long and $\frac{1}{2}$–1 in. broad, sometimes there is a more or less evident channel down the face of the leaf between the midrib and the margins, dull dark green, not glaucous, somewhat obscurely marked above and rather more distinctly beneath with irregular or interrupted transverse bands or irregularly scattered or grouped blotches of paler green, which often almost disappear with age; margins at first green, becoming whitish or pale reddish-brown, not hardened. *Flower-stem* $1\frac{1}{2}$–4 ft. high, $\frac{1}{6}$–$\frac{2}{5}$ in. thick at the base, light green, bearing on the lower half 3–6 distant membranous whitish ovate-lanceolate very acute sheaths $\frac{1}{2}$–4 in. long, and at the upper part a somewhat lax spike-like raceme of flower-clusters. *Bracts* $\frac{1}{4}$–$\frac{1}{2}$ in. long, spreading, lanceolate, acuminate, membranous, whitish. *Flowers* 2–4 in a cluster, white; pedicels 2–$3\frac{1}{2}$ lin. long, jointed close under the obconic base of the flower, with no evident or but a very short (up to $\frac{1}{2}$ lin. long) deciduous part when alive, but when dried the base of the flower sometimes contracts into a stalk-like part $\frac{1}{2}$–$\frac{3}{4}$ lin. long; tube 6-8 lin. long, shortly obconic but scarcely stalk-like at the base; lobes 8-11 lin. long, linear, obtuse, revolute.—De Wildem., Notices Pl. Utiles du Congo, pp. 624, 625, fig. 2. *S. guineensis*, Baker in Journ. Linn. Soc. vol. xiv, p. 547, in Kew Bull., May, 1887, p. 5, fig. 1, and Fl. Trop. Afr. vol. vii, p. 333, excluding all synonymy not mentioned here; Engler, Pflanzenwelt, C, t. 5, figs. A–F; De Wildem. Notices Pl. Utiles du Congo, p. 629, with fig., only; Ann. Inst. Colon. Marseille, 1902, t. 1; Volkens in Notizbl. Bot. Gart. Berlin, Append. 22, p. 52, fig. 120, not of Willdenow. *S. guineensis* var. β, Schultes, Syst. Veg. vol. vii, p. 355.

Tropical Africa. Locality unknown, cultivated plants!

Described from a living plant, a portion of the type received from the Paris Botanic Garden in 1903 at Kew, where it flowered April 30, 1909 and Aug. 4, 1910. This plant is identical with one that has been cultivated at Kew and elsewhere for many years under the wrong name of *S. guineensis*. Gérôme and Labroy, indeed, state that it appears to be only a variety of *S. guineensis*, meaning the plant commonly cultivated under that name. They describe the leaves as having a metallic tint, but this I have not observed on the plant as cultivated at Kew.

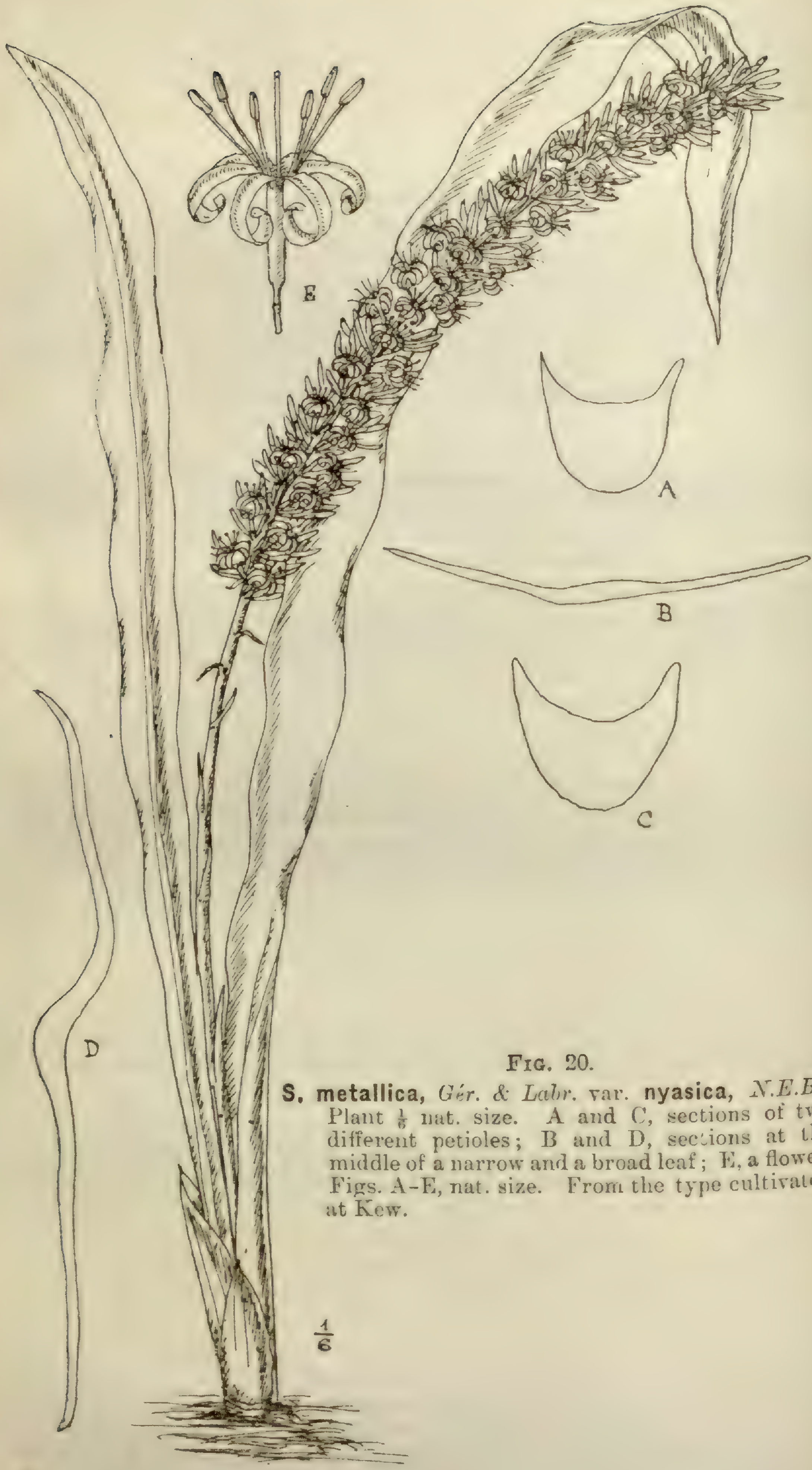


FIG. 20.

S. metallica, *Gér. & Labr.* var. **nyasica,** *N.E.Br.* Plant $\frac{1}{6}$ nat. size. A and C, sections of two different petioles; B and D, sections at the middle of a narrow and a broad leaf; E, a flower. Figs. A–E, nat. size. From the type cultivated at Kew.

PLATE V.

[To face page 240.

Sansevieria Dawei.

To face page 247.]

Var. **longituba,** *N. E. Brown.* *Flower-stem* brownish-green or dull purplish, thickly speckled with pale green. *Flowers* with pedicels 2–3½ lin. long, jointed close under the flower, with the deciduous part 0–½ lin. long; tube 14 lin. long; lobes 14 lin. long. Otherwise as in the type.

Tropical Africa. Locality unknown, cultivated plant!

Described from a living plant received from Paris Botanic Garden in 1906, which flowered at Kew Nov. 8, 1909.

Var. **nyasica,** *N. E. Brown* (fig. 20). *Flowers* with pedicels 2–3 lin. long, jointed at or a little above the middle, with the deciduous part about 1 lin. long; tube 7–8 lin. long, greenish-white or tinged with red; lobes 9 lin. long, white. Otherwise as in the type.

Tropical Africa. British Central Africa: Nyasaland, *Buchanan*!

Described from a living plant sent to Kew from Nyasaland, probably near Blantyre, by Sir John Buchanan, in 1892.

45. **S. liberica,** *Gér. & Labr.* in Bull. Mus. Hist. Nat. 1903, pp. 170, 173, fig. 4. *Stemless*, with a creeping rootstock about ¾ in. thick, pale greyish. *Leaves* 1–3 to a growth, erect or suberect when young, more or less spreading when old, firmly coriaceous, at least when old, smooth, 1½–3¼ ft. long, 2–5 in. broad, lanceolate, tapering from above the middle or somewhat abruptly at the upper part into an acute apex, with a subulate point 1–4 lin. long, which is at first green, becoming whitish, but not much hardened with age, tapering below the middle to a convolute base, but scarcely forming a petiole, slightly wavy; at first deep grass green, becoming dark green, sometimes without markings, but usually with some rather indistinct transverse paler green bands, often confined to the basal part of the leaf on the upper side, but occurring far up or to the apex of the underside; margins cartilaginous, pale reddish-brown, at first with membranous white edges, which disappear with age. *Flowers* not seen.—De Wildem. Notices Pl. Utiles du Congo, pp. 624–625, fig. 4.

Tropical Africa. Liberia: Introduced into cultivation at Paris by Dr. Julien in 1886.

Described from a living plant, a portion of the type, received at Kew from the Paris Botanic Garden in 1903.

46. **S. Dawei** *Stapf* in Journ. Linn. Soc. vol. xxxvii, p. 529 (*see* Plates). *Stemless*, with a creeping rootstock up to 1 in. or more thick. *Leaves* of adult plants 2–3 to a growth, ascending or suberect, smooth above, slightly rough beneath, 2–5 ft. long, 2¼–4½ in. (or more?) broad, elongate-lanceolate, tapering from above the middle upwards to an acute apex and downwards into a short or long concave-channelled petiole or sometimes almost without a petiole, uniformly dull deep green and somewhat glaucous on both sides (*Dawe*), but in living plants seen, variegated with pale green on both sides when young, margins reddish-brown. *Flower-stem* 1½–2½ ft. high, with 5–6 ovate or lanceolate acuminate membranous white sheaths on the basal third, and a rather compact spike-like raceme of flower-clusters above.

Bracts $\frac{1}{3}$–$\frac{2}{3}$ in. long, the secondary being about half as large as the primary and conspicuous, ovate or ovate-oblong, acute or subobtuse, greenish or tinged with dull purplish. *Flowers* 3–4 in a cluster, white; pedicels 2–3 lin. long, jointed close under the flower; tube $\frac{3}{4}$–1 in. long; lobes $\frac{2}{3}$–$\frac{7}{8}$ in. long.

Uganda. Busiro, *Dawe*, 109! Entebbe, *Matron*, 3!

Described from the type specimens and living plants. There are also specimens at Kew collected between Voi and the Taita Hills in British East Africa (*Grenfell* 2 & 12), and another received from the Imperial Institute under No. 21342 as the "Tuor. fibre plant from Uganda." A living plant at Kew has leaves green or bluish-green on both sides without markings when full grown, but when young they are sometimes irregularly marked with pale green spots or bands and usually with a distinct glaucous "bloom," they vary from $2\frac{1}{2}$ up to $4\frac{3}{4}$ in. in breadth. The flower-stem is of a lighter green than the leaves, with indications of being tinged with purple where exposed to the sun. Bracts up to $\frac{1}{3}$ in. long, reflexed or very spreading, ovate-lanceolate or narrowly lanceolate, acute. Tube of the flower about $1\frac{1}{6}$ in. long; lobes about 1 in. long. In all other particulars it agrees with *S. Dawei*.

The photographs of this species have been kindly sent by Mr. T. D. Maitland, District Agricultural Officer, Uganda, and were taken from plants growing in a native compound.

47. **S. angustiflora,** *Lindb.* in Acta Soc. Fennicae, vol. x, p. 130, t. 5. *Stemless*, with a thick creeping rootstock. *Leaves* up to 12 to a growth, ascending or spreading, stiff, $1\frac{1}{2}$–2 ft. long, $1\frac{1}{6}$–3 in. broad, 2–$2\frac{1}{2}$ lin. thick at the middle, narrowly or elongated-lanceolate, acutely tapering above the middle to a subulate green or withered point $\frac{1}{6}$–1 in. long, narrowed below into a rather short deeply concave-channelled petiole, dull green, marked with numerous paler green transverse bands; margins pale reddish ("whitish purple" *Lindberg*), but more or less green or whitish-green when young. *Flower-stem* $1\frac{1}{2}$–2 ft. high, $\frac{1}{3}$ in. thick at the base, green, obscurely marked with darker green, indistinctly glaucous, with 4–5 tapering pale brownish sheaths on the basal part and a spike-like raceme of flower-clusters at the upper two-thirds. *Bracts* membranous, 3–4 lin. long, ovate-lanceolate, acute. *Flowers* 3–6 in a cluster, white, with a greenish line down the back of the lobes; pedicels $1\frac{1}{2}$–2 lin. long, jointed near the apex; tube 9–$10\frac{1}{2}$ lin. long; lobes about as long as the tube, linear, obtuse, revolute.—*S. angustifolia* (by error for *S. angustiflora*), Baker in Journ. Linn. Soc. vol. xiv. p. 547, under *S. thyrsiflora*.

South Africa. Natal or Zululand, *Wood*!

The native country of this species was unknown to Dr. Lindberg, but a plant sent to Kew from Durban Botanic Garden by Dr. J. Medley Wood, as being a native of either Natal or Zululand, so completely agrees with Dr. Lindberg's figure and description that I cannot doubt its identity with that species, of which Dr. Lindberg informs me no specimen has been preserved and that the plant is now dead. So that unless a portion

of the plant from which this species was described is still in cultivation elsewhere, there seems little probability of confirming my identification, which I nevertheless believe to be correct, and this species is therefore the eastern representative of *S. thyrsiflora*, to which it was referred as a synonym by Mr. Baker, but essentially differs from that species by the more numerous leaves (usually varying from 5 to 12) to a growth, by their more elongated-lanceolate form, with the central part more even in breadth, by their brighter and more pronounced variegation and narrower reddish margin. Dried specimens or living plants of it placed side by side of those of *S. thyrsiflora* seem perfectly distinct and are easily recognised. The above description is entirely copied from that of Lindberg, without reference to Dr. Wood's plant, but completely agrees with the latter.

48. **S. thyrsiflora,** *Thunb.* Prodr. Pl. Cap. p. 65. *Stemless.* with a stout creeping rootstock. *Leaves.* 2 4 to a growth, erect, smooth, $\frac{1}{2}$–$1\frac{1}{2}$ ft. long, 1–$3\frac{1}{2}$ in. broad, about $\frac{1}{8}$ in. thick at the middle, lanceolate, acute or obtuse, and usually with a white withered point up to 8 lin. long at the apex, but on some leaves it is absent, tapering from or below the middle into a concave-channelled petiole, dull green, marked on both sides with numerous closely placed transverse paler green bands, which become obscure or almost disappear with age; margins hardened, brownish-red or sometimes whitish under cultivation. *Flower-stem* $1\frac{1}{2}$–$2\frac{1}{2}$ ft. high, with 5 7 narrowly lanceolate or ovate-lanceolate sheaths 1–3 in. long and $\frac{1}{2}$ in. broad on the basal part and a spike-like raceme of flower-clusters above. *Bracts* 2–6 lin. long. $\frac{2}{3}$–$1\frac{1}{2}$ lin. broad, ovate-lanceolate to narrowly lanceolate, acute, spreading, membranous. *Flowers* 2-6 in a cluster; pedicels $1\frac{1}{2}$–3 lin. long, sometimes jointed a little above the middle, with a distinct deciduous part, sometimes close under the flower, with no evident deciduous part; tube about 9 lin. long, greenish-white; lobes about 9 lin. long, linear, subobtuse, revolute, whitish.—Thunb. Fl. Cap. ed Schultes, p. 329, excluding synonym; Pappe, Flor. Cap. ed. 2, p. 40; Baker in Journ. Linn. Soc. vol. xiv, p. 547, in Kew Bulletin, May, 1887, pp. 8 and 3, fig. 4, and in Fl. Cap. vol. vi, p. 5, excluding synonyms *S. fulvocincta*, Haw. and *S. angustifolia*, Bak.; Schinz in Bull. Herb. Boiss. vol. iv. Append. 3, p. 45. Gérôme and Labroy in Bull. Mus. Hist. Nat. Paris, 1903, pp. 172 173, fig. 6: De Wildeman, Notices Pl. Utiles du Congo, pp. 624 625, fig. 6, and p. 630 with fig. *S. guineensis*, Willd. Sp. Pl. vol. ii, p. 159, and Enum. Pl. Hort. Berol. p. 375 (excluding synonym *Aletris guineensis*, Jacq.): Gawler in Bot. Mag. t. 1180 (1179 by error): Aiton, Hort. Kew ed. 2, vol. ii. p. 278; Redouté, Liliacées, vol. vi, t. 330: Drapiez, Herb. Amat. de Fl. vol. i, t. 67: Haworth, Synop. Pl. Succ. p. 65: Link, Enum. Pl. Hort. Berol. vol. i, p. 342; Spreng. Syst. Veg. vol. ii, p. 93; Schultes, Syst. Veg. vol. vii, p. 355. *S. guineensis* var. β. Kunth. Enum. Pl. vol. v. p. 16. *S. spicata*, Haw. Synop. Pl. Succ. p. 66; Link, Enum. Plant. Hort. Berol. vol. i, p. 342; Sprengel, Syst. Veg. vol.

ii, p. 94; Schultes, Syst. Veg. vol. vii, p. 359; Kunth, Enum. Pl. vol. v, p. 20. *S. latifolia*, Bojer, Hort. Maurit. p. 348. *S. hyacinthoides*, Steud. Nom. Bot. ed. 2, vol. ii, p. 511. *S. rufocincta*, Baker, in Journ. Linn. Soc. vol. xiv, p. 548, under *S. thyrsiflora*. *Sanseverinia thyrsiflora*, Petagna, Institutiones Botanica, vol. iii, p. 643. *Salmia spicata*, Cavanilles Icon. vol. iii, p. 24, t. 246: *Aloe guineensis radice geniculata &c.*, Commelin, Hort. Med. Amstel. Rar. vol. ii, p. 39, fig. 20, and Praelud. Bot. p. 84, fig. 33. *Aloe hyacinthoides*, var. *guineensis*, Linn. Sp. Pl. ed. 1, p. 321. *Aletris hyacinthoides*, var. *guineensis*, Linn. Sp. Pl. ed. 2, p. 456; Aiton, Hort. Kew, ed. 1, vol. i, p. 464.

South Africa. Uitenhage Div.: in woods by the Zwartkops River, *Zeyher*, 612! near Enon, *Drège*, 8613! *Baur*, 1099! Albany Div.: without precise locality, *Cooper*, 3269! and cultivated specimens! Very common along the coast region of East London and Albany Divisions and extending into Queenstown Div., where it grows on the summits of hills at 4000 ft. above sea level, according to *Galpin*.

Described from living plants cultivated at Kew. Mr. Galpin informs me that a factory was established in Grahamstown many years ago to manufacture fibre from the leaves of this plant, but it did not prove successful. Pappe states that the fleshy rootstock "when boiled, is made use of internally in piles, and is called *t'Kay* by the natives."

This plant appears to have been introduced into Dutch gardens before 1701 and was supposed to have come from Guinea. In consequence of this statement the identity of the plant figured by Commelin with a South African species appears not to have been suspected and hence much confusion has arisen. For although Willdenow quoted *S. thyrsiflora* as a synonym, no attention has been paid by later authors to this, and the specific name has been applied to more than one Tropical African species, although bearing little resemblance to Commelin's figure. One plant that has been supposed to be *S. guineensis* is *S. trifasciata*, Prain (*Aletris hyacinthoides*, Mill. and *A. guineensis*, Jacq.). Another, which is very widely cultivated under the name of *S. guineensis*, is *S. metallica*, Gér. & Labr., which see. The name *Sanseverinia thyrsiflora*, Petagna, was founded in 1787 upon Commelin's figure, upon which *S. guineensis*, Willd. was also founded at a later date.

49. **S. grandis,** *Hook. f.* in Bot. Mag. t. 7877. *Stemless*, with a creeping rootstock sometimes as much as 2 ft. long without producing leaves, 1–1½ in. thick, whitish or green. *Leaves* 4–5 to a growth, ascending or ascending-spreading, very slightly rough, 1–2 ft. long, 3½–6 in. broad, ½–⅛ in. thick at the middle, stiffly coriaceous, elliptic, oblong or broadly lanceolate, acute, with a soft white point ⅙–¼ in. long, narrowed and all convolute at the base, but scarcely petiolate, flat, with slightly wavy recurving borders having reddish-brown hardened margins ⅓ lin. broad, with narrow membranous white edges when young, but soon disappearing, dull glaucous-green or somewhat bluish-green, with

rather inconspicuous irregular transverse bars of lighter green on both sides, but more evident on the undersurface. *Flower-stem* about 2 ft. high, 4–5 lin. thick below, the lower third with 4–5 distant sheathing membranous sheaths $\frac{1}{2}$–$\frac{3}{4}$ in. long and as much in breadth, ovate obtuse; upper two-thirds a compact spike-like raceme. *Bracts* $\frac{1}{8}$–$\frac{1}{4}$ in. long, membranous, ovate or ovate-lanceolate, acute. *Flowers* white; pedicels 1–22 lin. long, jointed at the apex, with scarcely any deciduous part; tube $\frac{3}{4}$ in. long,

FIG. 21.

S. grandis, *Hook. f.* var. **zuluensis,** *N.E.Br.* Plant $\frac{1}{6}$ nat. size. A, section at middle of leaf, nat. size; B, flower, nat. size. From the type plant cultivated at Kew.

rounded at the base; lobes $\frac{3}{4}$ in. long, linear, obtuse, revolute.—De Wildeman, Notices Pl. Utiles du Congo, pp. 627, 633; Holland in Kew Bulletin 1907, p. 369. *S. nobilis*, Godefroy-Lebeuf, Les Sansevierias Gigantesques, p. 12, name only.

ORIGIN UNKNOWN. Probably native in South Africa, since the variety described below seems only to differ in its flowers.

Described from the type plant, cultivated at Kew, originally obtained from Cuba, where it had been imported for cultivation.

According to Messrs. Ide and Christie, *Bot. Mag.*, it yields "a good class fibre, much liked." Its value was then £35 per ton (Sept., 1902).

Var. **zuluensis,** *N. E. Brown* (fig. 23). *Leaves* 2½–4 in. broad. *Flowers* with pedicels 2–3 lin. long, jointed at or slightly above the middle, with a distinct deciduous part; tube 10–14 lin. long; lobes 10–11 lin. long. Otherwise as in the type.

South Africa. Zululand, at Somkele, *Wylie in Herb. Wood*, 12,010! and cultivated specimens!

Described from living plants sent by Dr. J. Medley Wood in 1910 to Kew, where it flowered in September, 1911. The flowers expand at about 4.30 p.m. The specimen from Nelspruit (see *Kew Bull.* 1907, p. 369, under *S. grandis*) probably belongs to this variety. The material consists of leaves only, which are narrower than in the typical form.

50. **S. Raffillii,** *N. E. Brown* (fig. 24). *Stemless*, with a very stout creeping rootstock ¾–2 in. thick, whitish. *Leaves* of juvenile plants 3–4, and of adult flowering plants 1–2 to a growth, with some sheaths surrounding their base, erect, rigid, smooth 2–3½ ft. long, 2¼–5 in. broad, ¼–⅓ in. thick, elongated lanceolate or broadly strap-shaped, acute, with a short hard reddish-brown point, narrowed below the middle to a sessile base or into a short stout concave petiole; when young handsomely variegated with large elongated oval closely placed blotches or broad irregular transverse bars of yellowish-green on a darker green ground on both sides, or the paler markings on the back of the leaf sometimes whitish, the paler colour occupying the greater area, slightly glaucous, with age the markings become less conspicuous; margins hardened, reddish-brown. *Flower-stem* 3–3¾ ft. high, ½–⅔ in. thick at the basal part, and there bearing 5–6 lanceolate acuminate or subulate pointed sheaths 2–5½ in. long, of which the lower are rather rigid and coloured like the leaves, the upper becoming thinner or membranous; the upper part of the stem bears a spike-like raceme 2–2½ ft. long. *Bracts* 2½–8 lin. long, 1¼–2½ lin. broad, ovate-lanceolate, acuminate, membranous, pale greenish-white. *Flowers* 2–5 in a cluster; pedicels 2–3 lin. long, jointed above the middle, with the persistent part 1¼–2 lin. long and a very distinct deciduous part ⅔–1 lin. long: tube 1–1⅛ in. long, greenish-white, slightly glaucous; lobes 1⅛–1⅙ in. long, linear, obtuse, revolute, white.

British East Africa. Tsavo district, scarce, *Powell*, 7!

Described from a plant, which flowered at Kew Dec. 20, 1910.

Var. **glauca**, *N. E. Brown*.—*Leaves* very dark bluish-green, marked with distinct, but not very conspicuous, irregular spots or somewhat zig-zag transverse bands of lighter green 1–2 in. apart, very distinctly bluish-glaucous all over. *Flower-stem* bluish-glaucous below, lighter green speckled with pale green above, with the sheaths on its basal part very pale green or whitish-green, dusted or banded with darker green, with submembranous greenish or reddish tinted margins, not or but slightly glaucous. *Bracts* incurved-spreading, the lower about 1 in. long and the upper about ⅓ in. long, linear-lanceolate, very

FIG. 22.

S. Raffillii, *N.E.Br.* Adult plant, and A, seedling, $\frac{1}{6}$ nat. size; B, section below middle of adult leaf, nat. size; C, flower, nat. size. From the type cultivated at Kew. The anthers had fallen.

acute, green, with broad whitish margins. *Pedicels* $2\frac{1}{2}$–3 lin. long, jointed at the apex, close under the swollen base of the flower, with no distinct deciduous part, slightly glaucous. Otherwise as in the type.

British East Africa. Tsavo district, scarce, *Powell*, 8!

Described from a living plant, which flowered at Kew in August, 1911. This species and its variety is very distinct from all others, and has rather handsome foliage. From the length and thickness of its rigid leaves it would probably yield a fibre of about the same quality and bulk as that of *S. Kirkii*.

51. **S. Kirkii,** *Baker* in *Kew Bull.*, May, 1887, pp. 8 and 3, fig. 3 (Fig. 25). *Stemless*, with a stout creeping rootstock and crowded leaf-tufts. *Leaves* 1–3 to a growth, very rigid or sometimes becoming stiffly coriaceous towards the apex, smooth. In juvenile plants spreading or recurved-spreading, 7–15 in. or more long, $1\frac{3}{4}$–$3\frac{3}{4}$ in. broad, scarcely or but shortly petiolate, concave or flattish, lanceolate, acute, tipped with a firm or hard pale whitish-brown point $\frac{1}{3}$–$\frac{1}{2}$ in. long, very wavy along the sides; margins hardened, reddish-brown, and when young edged with white, at length often breaking up into thread-like fibres. In adult plants the leaves are $2\frac{1}{2}$–6 (or according to *Kirk* up to 9) ft. long, $2\frac{1}{3}$–$3\frac{1}{2}$ in. broad, 4–7 lin. thick at about the middle, erect or ascending-spreading, or in some cases the upper part is more or less recurved or even drooping, elongate-lanceolate or broadly strap-shaped, with the apex, wavy margins and edges as in the juvenile leaves, but more or less hooded at the base of the stout tip, flattish or concave above, with a very broad rounded midrib on the back, gradually narrowed from about the middle into a very stout deeply concave-channelled petiole 1–$1\frac{1}{4}$ in. broad and $1\frac{1}{2}$ in. thick from the edges to the very rounded back; both surfaces of all forms of leaf greyish-green on both sides or rather light grass-green above and greyish-green beneath (as if densely dusted with green and whitish or pale green), slightly shining above, opaque beneath, mottled or with a tendency to be transversely barred with whitish-green or with pale green above and whitish-green beneath, more distinctly on the juvenile than on the adult forms, both sides of the adult and some of the juvenile leaves are marked with longitudinal dark green lines (becoming slight furrows as the leaves wither from age), usually about 3–4 on the upper surface and 3–9 on the under surface, sometimes extending $\frac{3}{4}$ of the way up the leaves, sometimes very much shorter. *Flower-stem* $1\frac{1}{4}$–2 ft. high, $\frac{1}{2}$ in. thick, dull purplish-brown, thickly speckled with pale green or dull whitish, with 5–6 distant ovate acute sheaths 2–3 in. long and $1\frac{1}{2}$ in. broad (when flattened out), the upper of which are more or less spreading from the stem and deeply boat-shaped, green, speckled with fuscous or dull purplish brown at the tips. *Flower-spike* head-like, dense, many-flowered, with an axis $1\frac{1}{2}$–$2\frac{1}{2}$ in. long. Lower *bracts* 1–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–$\frac{3}{4}$ in. or more broad, the others gradually smaller; ovate or oblong-ovate, acute or subobtuse, green, suffused with dull purplish-brown and dotted with paler, the lower with 4, the upper with 2 flowers in each axil. *Flowers* erect or ascending;

pedicels 3–5 lin. long, not jointed; tube about $4\frac{1}{2}$–5 in. long, pale, purplish or dull pink; lobes $1\frac{1}{4}$–$1\frac{3}{4}$ in. long, $\frac{3}{4}$–$1\frac{1}{4}$ lin. broad, linear, obtuse, spreading, with revolute tips, white, tinged with

FIG. 23.

S. Kirkii. *Baker.* Plant $\frac{1}{6}$ nat. size, the two longer leaves have their margins inrolled in an unusual manner. A, section 4 ft. above base of adult leaf, nat. size; B, flower, nat. size. From a plant cultivated at Kew.

green on the back and at the tips.—Baker in Kew Bull. 1893, p. 186, in Bot. Mag. t. 7357, and in Fl. Trop. Afr., vol. vii, p. 334; Gérôme & Labroy in Bull. Mus. Hist. Nat. 1903, pp. 170, 172, 173, fig. 7; De Wildem. Notices Pl. Utiles du Congo, pp. 622, 624, 625, fig. 7, and pp. 632, 635. *S. Aubrytiana*, Gérôme & Labroy in Bull. Mus. Hist. Nat. 1903, pp. 169, 172, 173, fig. 9, not of Carrière. *S. Aubryana*, De Wildem. Notices Pl. Utiles du Congo, pp. 623, 624, 625, f. 9, and p. 634. May.

Tropical Africa. German East Africa: Abundant near Pangane, *Kirk*! Zanzibar: Growing on the coral, *Lyne*, 3! at the entrance of a cavern at the south of the island (this may possibly be var. *pulchra*), *Sacleux*, 1496!

Described from the type plant, cultivated at Kew, sent by Sir John Kirk (see *Kew Bull.* May, 1887, p. 7, under *S. longiflora*).

Var. **pulchra**, *N. E. Br.*—*Leaves*, especially the younger, handsomely and conspicuously marked with whitish-green or somewhat buff-coloured or sometimes almost reddish spots or irregular bands on both sides and with a white membranous edge to the red-brown margin. *Bracts* lanceolate; otherwise as in the type. *S. longiflora*, Gérôme & Labr. in Bull. Mus. Hist. Nat. 1903, pp. 172–173, fig. 8; and De Wildem., Notices Pl. Utiles du Congo, pp. 624–625, fig. 8, and p. 630, not of Sims.

Tropical Africa. Zanzibar, *Last*!

Described from a living plant sent to Kew by Mr. Last from Zanzibar in 1903, which flowered Sept. 10, 1912; a plant identical with it was received from Paris Botanic Garden in 1904 under the name of *S. longiflora*, from which it is quite distinct.

52. **S. longiflora**, *Sims*, Bot. Mag. t. 2634.—*Stemless*, with a creeping rootstock. *Leaves* apparently smooth, 15–18 in. long, 3–3½ in. broad in the specimens seen, but perhaps attaining larger dimensions, coriaceous, lanceolate, acute, with a hard brown spike-like point ⅛–¼ in. long, narrowed at the base into a concave-channelled petiole about 3 in. long, with hardened red-brown margins and having (always?) a shallow channel or fold towards each margin down the upper surface; dark green, marked on both sides with blotches and spots of paler green, which are scattered or arranged in irregular transverse bands. *Flower-stem* with the part below the flowers 10–12 in. long, perhaps more in robust specimens, bearing 5–7 thin sheaths 1–2¾ in. long, tapering from the stem-clasping base to a very fine point; flowering part 3–15 in. long, forming a head or dense spike-like raceme. *Bracts* ascending, ½–1 in. long, lanceolate, tapering to an acute point, submembranous. *Flowers*, apparently 2–3 in the axil of each bract, erect; pedicels ¾–1½ lin. long, jointed close under the flower, no deciduous part; tube 3½–4 in. long and about ⅛ in. in diam., greenish-white; lobes 1⅓–1½ in. long, linear, obtuse, revolute, white. Schultes, Syst. Veg., vol. vii. pp. 357, 1678; Kunth Enum. Pl., vol. v. p. 17; Monteiro, Angola and the River Congo, vol. i. pp. 45, 103; Baker in *Kew Bulletin*, May, 1887, p. 7, and Fl. Trop. Afr., vol. vii. p. 334, partly, as to the Congo and Angola plant only; De Wildem., Mission E. Laurent, p. clvi.

Tropical Africa. Lower Congo. *Chr. Smith*! Angola: Ambriz, *Monteiro*! Belgian Congo; Eala, *Laurent*.

Described from dried specimens. According to Monteiro it "is only noticed north from Ambriz to Congo, and only growing very near the sea: *S. angolensis* is but rarely seen with it, and it is very curious how distinctly these two types are separated." Elsewhere he states that "*S. longiflora* is extremely abundant and disappears south almost entirely about Musserra, where it is in turn replaced by *S. angolensis*" (*S. cylindrica*, Boj.).

Var. **fernandopoensis**, *N. E. Brown.*—*Flowers* with pedicels $2\frac{1}{2}$–3 lin. long, jointed just above the middle, and a tube $2\frac{1}{2}$–3 in. long; otherwise apparently the same as the type.

Tropical Africa. Fernando Po, *Barter*, 2060! *Mann*, 1169!

The plant figured in Karsten and Schenck *Vegetationsbilder*, vol. 5, t. 41 as being *S. longiflora* is not in the least like that species, but is one of the kinds having cylindric leaves allied to *S. rhodesiana*, which I am unable to identify from the figure.

53. **S. bracteata,** *Baker* in Trans. Linn. Soc. ser. 2, vol. i, p. 253. *Stemless* with a creeping rootstock "very thick, orange-vermilion outside, white inside. *Leaves* erect, very thick and rigid" (*Welwitsch*), adult forms $1\frac{1}{4}$–2 (or more?) ft. long, 2–$2\frac{3}{4}$ (or more?) in. broad, lanceolate, tapering into a point $\frac{1}{4}$ in. or more long, and from or below the middle (in specimens seen) into a stout concave-channelled petiole, variegated on both sides with irregular zigzag pale green or whitish-green bands or blotches, which are usually much broader than the dark green ones alternating with them, two or three of those at the base 1 in. or more broad, the rest about half as broad, closely placed and more or less spotted, "glaucous, spotted with white and green" (*Welwitsch*); margins hardened, brownish-red, sometimes with whitish edge. *Flower-stem* erect, $1\frac{1}{2}$–2 ft. high, with distant ovate acute sheaths 1–2 in. long on the basal part and a short dense spike-like raceme, with an axis 2–$2\frac{1}{2}$ in. long above. *Bracts* erect, $\frac{1}{2}$–$\frac{3}{4}$ in. long, lanceolate or oblong-lanceolate, acute. *Flowers* erect, white; pedicels 1–$1\frac{1}{2}$ lin. long, jointed above the middle, with the persistent part $\frac{1}{2}$–1 lin. long; tube $3\frac{1}{2}$–$4\frac{1}{2}$ in. long; lobes about 1–$1\frac{1}{4}$ in. long 1 lin. broad, linear-subspathulate.—Baker in Fl. Trop. Afr. vol. vii, p. 333; Hiern, Cat. Afr. Pl. Welw. vol. ii, p. 25.

Angola. Plentiful in the districts of Icolo e Bengo and Loanda, from Quicuxe to Mutollo and towards Funda. *Welwitsch*, 3750! Pungo Andongo; in rather dry lofty parts of the Praesidium, towards the south, *Welwitsch*, 3751! between the Kubango and Kuito Rivers, *Baum*, 517!

Baum states (*Kunene-Sambesi Expedition*, p. 510) that the fibre of this species is used by the Kaffirs for making nets, and by the Bushmen for nooses to snare animals. This must be closely allied to *S. Aubrytiana*, Carrière (not of Gérôme & Labroy) and possibly a form of it.

54. **S. Braunii,** *Engler & Krause* in Engl. Jahrb. vol. xlv, p. 153. *Leaves* rigid, coriaceous $1\frac{3}{4}$–$2\frac{1}{4}$ ft. long, $2\frac{3}{4}$–$4\frac{1}{3}$ in. broad, flat, lanceolate-oblong, acuminate, slightly narrowed to the base, green, sparingly blotched or banded with whitish and having

hardened red-brown edges. *Flower-stem* 1½ ft. high, reddish, with a flower-spike or head 6 in. in diam. *Bracts* small, lanceolate, acute, reddish. *Flowers* white; pedicels short, slender; tube about ¾ in. long; lobes about 1–1¼ in. long.

East Africa. Ujiji and Sigital, near Amani, *Braun*, 1976.

Imperfectly Known and Excluded Species.

S. Aubrytiana, *Carrière* in Rev. Hort. 1861, pp. 448, 449. A very vigorous plant, near *S. longiflora*, but distinguished from that species by its greater vigour, usually larger leaves, more tapering at the apex, of a lighter colour, very strongly banded on both surfaces and more conspicuously than in *S. longiflora*.

Gaboon. Sent to Paris Botanic Garden by *Aubry-le-Comte*, when Governor of Gaboon.

Plant not see, but *S. bracteata*, Baker, may possibly be the same species. That which in 1909 was cultivated in the Paris Botanic Garden under the name of *S. Aubrytiana* (doubtless of Gérôme and Labroy) proves to be *S. Kirkii*, Baker, a native of East Africa and Zanzibar.

S. cannaefolia, *Spreng.* Syst. Veg. vol. ii, p. 93, is **Cordyline cannaefolia,** *R. Br.*

Australia.

S. carnea, *Andr.* Bot. Rep. vol. vi, t. 361 (1804), is **Reineckea carnea,** *Kunth.*

China and Japan.

S. cylindrica, *Schweinfurth* in Bull. Herb. Boiss. vol. ii, Append. 2, p. 77, and *Flori*, Boschi e Piante Legn. Eritrea, p. 105, not of *Bojer.*

Tropical Africa. Eritrea, *Schweinfurth*, 830, 1468! 1833, 1886.

This plant is totally different from *S. cylindrica*, Bojer, and possibly an undescribed species. I have only seen No. 1468, which is insufficient for a description. *S. canaliculata*, Carrière, may possibly be included under the above name.

S. flavescens, *Index Kewensis*, Suppl. 1, p. 379, is an error for **Schieckia flavescens,** *Maury.*

S. flexuosa, *Blume*, Enum. Pl. Jav. p. 11; *Schultes*, Syst. Veg. vol. 7, pp. 360, 1678; *Kunth*, Enum. vol. v, p. 21, excluding references to *Hasskarl*, is **Pleomele flexuosa,** *N. E. Br.*

This is quite distinct from *Dracaena angustifolia*, Roxb. (**Pleomele angustifolia,** *N. E. Br.*), to which Mr. Baker has referred it, and also from the plant formerly known in gardens as *D. flexuosa*, under the supposition that it was the same as Blume's plant. Both of those plants have a paniculate inflorescence, whilst Blume's plant has a simple dense raceme.

Formerly cultivated in gardens in Java, perhaps a native.

S. flexuosa, *Hasskarl* in Tijdschrift Natur. Geschied. en Phys. vol. ix, p. 135 & Pl. Jav. Rar. p. 113, not of *Blume*, is **Pleomele falsa,** *N. E. Br.*

This is a *Pleomele* which I fail to identify with any known species and have therefore given it the above name. It is quite

distinct from the above mentioned *S. flexuosa*, Blume, in having a paniculate inflorescence instead of a simple spike-like raceme.

JAVA.

S. fragrans, *Jacq.* Fragm. Bot. p. 5, t. 2, fig. 6 & p. 29, t. 33, fig. 1, is **Pleomele fragrans,** *N. E. Br.* (*Dracaena fragrans*, Gawler, Bot. Mag. t. 1081).

WEST TROPICAL AFRICA.

S. fruticosa, *Blume*, Enum. Pl. Jav. p. 11; Schultes, Syst. Veg. vol. 7, pp. 361, 1679, is **Pleomele fruticosa,** *N. E. Br.*

MOLLUCCA ISLES & JAVA.

S. fulvocincta, *Haw.* Suppl. Pl. Succ. p. 30. *Leaves* of a young plant about 5, 6 in. long. (1 in. and 5 lin. broad. ex *Link*), revolutely recurved, lurid green, obsoletely spotted, slenderly margined with fulvous. (*Flowers* in fascicles, racemosely arranged. *Bracts* longer than the pedicels. *Style* rather longer than the stamens, ex *Sprengel*).—Link, Enum. Pl. Hort. Berol. vol i, p. 342; Spreng. Syst. Veg. vol. ii, p. 94; Schultes, Syst. Veg. vol. iii, p. 360; Kunth, Enum. Pl., vol. v, p. 20.

BRAZIL. (?)

Described from a plant cultivated at Kew in 1818, and is evidently only the juvenile state of possibly a well-known species.

S. glauca, *Haw.* Syn. Pl. Succ. p. 65, not of Gérôme & Labroy. *Leaves* about 11 to a tuft, spreading, somewhat flaccid, broadly lanceolate-sword-shaped, glaucous, obsoletely banded.—Sprengel, Syst. Veg. vol. ii, p. 93; Schultes, Syst. Veg. vol. vii, p. 359; Kunth, Enum. Pl. vol. v, p. 20.

Country unknown.

S. javanica, *Blume*, Enum. Pl. Jav. p. 11; Schultes, Syst. Veg. vol. vii, pp. 360, 1678, is **Dracaena javanica,** *Kunth*, Enum. Pl. vol. v, p. 12, but probably belongs to the genus **Pleomele.**

JAVA.

S. laetevirens, *Haw.* Synop. Pl. Succ. p. 66. *Leaves* about 3 to a growth, spreading, flaccid, broadly lanceolate-ensiform, without veins, light green, with the transverse markings usually obliterated.—Link, Enum. Pl. Hort. Berol. vol. i, p. 342; Sprengel, Syst. Veg. vol. ii, p. 93; Schultes, Syst. Veg. vol. vii, p. 356; Kunth, Enum. Pl. vol. v, p. 17.

Origin unknown and no plant seen.

S. paniculata, *Schinz* in Dur. and Schinz, Consp. Fl. Afr. vol. v, p. 141, is **Pleomele Hookeriana,** *N.E.Br.*

SOUTH AFRICA.

S. polyphylla, *Haw.* Synop. Pl. Succ. p. 65. *Leaves* about 19 to a growth, suberect, rigid, somewhat fragile, broadly lanceolate-sword-shaped, obsoletely banded, glaucous.—Sprengel, Syst. Veg. vol. ii. p. 93; Schultes, Syst. Veg. vol. vii, p. 359; Kunth, Enum. Pl. vol. v, p. 20.

Country unknown. This may not belong to the genus.

S. pumila, *De Spin*, Jard. St. Sebast. ed. 2, p. 28 (not of Haw.). *Leaves* short, thick, recurved, keeled, obscurely green-spotted.—*S. guineensis* var. γ, Schultes, Syst. Veg. vol. vii. p. 355.

Country not stated, said to have been introduced before 1796.

Schultes states that De Spin had the plant in cultivation for 15 years without flowers being developed. From the description given, it appears to me that there can be very little doubt that this was a seedling or juvenile plant of some species that is now probably well known. The juvenile state of several species is very similar to such a plant as De Spin describes.

S. rosea, Dietr. Bollstand. Lexic. Gaertn. & Bot. vol. viii, p. 504, is **Reineckea carnea,** Kunth.

China and Japan.

S. sarmentosa, Jacq. Fragm. pp. 68 & 83, tt. 102 & 132, fig. 4, is **Reineckea carnea,** *Kunth.*

China and Japan.

S. sessiliflora, *Ker* Gawl. in Bot. Mag. t. 739 is, **Reineckea carnea,** Kunth.

China and Japan.

S. stenophylla, *Link,* Enum. Pl. Hort. Berol. vol. i, p. 342. *Leaves* very long, not tapering to the base, slightly channelled and marked with 3 longitudinal lines on the upper side, convex and marked with 4 longitudinal lines on the under side, green, not transversely banded.—Schultes, Syst. Veg. vol. vii, p. 359; Kunth, Enum. Pl. vol. v, p. 20.

Origin not stated.

S. striata, *Don* ex *Steud.* and **S. venosa,** *Don* ex *Steud.* Nomencl. Bot. ed. 2, vol. ii, p. 511. Names only.

Index to Species and Synonyms.

	PAGE
Acynthia guineensis, Medik. ...	240
Aletris guineensis, Jacq.	240
,, hyacinthoides, L. var. guineensis, L.	250
,, ,, var. zeylanica, Ait.	230
,, ,, var. zeylanica, L....	226
,, hyacinthoides, Mill.	240
,, zeylanica, Lam.	226
,, ,, var. β Lam. ...	226
,, ,, Mill.	230
Aloe guineensis, Jacq.	240
,, guineensis radice, &c. Comm.	250
,, hyacinthoides, L. var. guineensis, L.	250
,, ,, var. zeylanica, L. ...	226
,, zeylanica, Jacq.	226
Cordyline cannaefolia, R. Br. ...	258
Dracaena angustifolia, Roxb. ...	259
,, flexuosa, Hort.	259
,, fragrans, Gawl.	259
,, **javanica,** Kunth ...	259
Pleomele aloifolia, Salisb. ...	240
,, **angustifolia,** N. E. Br.	258
,, **falsa,** N. E. Br. ...	258
,, **flexuosa,** N. E. Br. ...	258
,, **fragrans,** N. E. Br. ...	259
,, **fruticosa,** N. E. Br. ...	259
,, **Hookeriana,** N. E. Br.	259
Reineckea carnea, Kunth	258, 260
Salmia ebracteata, Cav.	226
,, guineensis, Cav.	240
,, spicata, Cav.	250
Sansevierinia rorida, Lanza ...	206
,, thyrsiflora, Petag. ...	250

	PAGE
Sansevieria abyssinica, N. E. Br.	241
,, **aethiopica,** Thunb. ...	230
,, Andradae, Godefr. Leb. ...	221
,, angolensis, Welw.	218
,, **angustiflora,** Lindb. ...	248
,, angustifolia, Baker ...	248
,, **arborescens,** Cornu 198,	201
,, Aubryana, De Wildem. ...	256
,, **Aubrytiana,** Carr. ...	258
,, Aubrytiana, Gér. & Labr.	256
,, **bagamoyensis,** N. E. Br.	197
,, **bracteata,** Baker	257
,, **Braunii,** Engl. & Krause...	257
,, **burmanica,** N. E. Br.	228
,, **canaliculata,** Carr. ...	224
,, cannaefolia, Spreng. ...	258
,, carnea, Andr.	258
,, **caulescens,** N. E. Br. ...	200
,, **chinensis,** Gent.	242
,, **concinna,** N. E. Br. ...	233
,, **conspicua,** N. E. Br. ...	243
,, Cornui, Gér. & Labr. ...	236
,, cylindrica, Baum	217
,, **cylindrica,** Bojer 210,	217
,, ,, var. **patula,** N. E. Br. 210,	218
,, cylindrica, Schweinf. ...	258
,, **Dawei,** Stapf	247
,, **deserti,** N. E. Br. ...	208
,, **Dooneri,** N. E. Br. ...	231
,, Ehrenbergii, De Wildem.	206
,, Ehrenbergii, Gér. & Labr.	206
,, Ehrenbergii, K. Schum. ...	208
,, **Ehrenbergii,** Schweinf. ...	207

	PAGE
Sansevieria ensifolia, Haw.	... 231
,, **fasciata,** Cornu ...	... 241
,, flavescens, Ind. Kew	... 258
,, flexuosa, Blume ...	... 258
,, flexuosa, Hassk. ...	... 258
,, fragrans, Jacq. ...	... 259
,, fruticosa, Blume ...	... 259
,, **fulvocincta,** Haw.	...259
,, glauca, Gér. & Labr.	... 230
,, **glauca,** Haw. ...	... 259
,, **gracilis,** N. E. Br.	... 204
,, **grandicuspis,** Haw.	... 231
,, **grandis,** Hook. f. ...	... 250
,, ,, var. **zuluensis,** N. E. Br.	... 252
,, guineensis, Baker & others	245
,, guineensis, Gér. & Labr.	... 240
,, guineensis, Hort. ...	... 218
,, guineensis, Willd. ...	... 249
,, guineensis, Schweinf.	... 242
,, guineensis, var. γ, Schult.	260
,, hyacinthoides, Steud.	... 250
,, **intermedia,** N. E. Br.	... 211
,, Jacquinii, N. E. Br.	... 240
,, javanica, Blume ...	... 259
,, **Kirkii,** Baker ...	... 254
,, ,, var. **pulchra,** N. E. Br.	256
,, **laetevirens,** Haw.	... 259
,, **lanuginosa,** Willd.	... 225
,, lasciata, Gent. ...	... 241
,, latifolia, Bojer ...	... 249
,, Laurentii, De Wildem.	... 240
,, **liberica,** Gér. & Labr.	... 247
,, **longiflora,** Sims ...	... 256
,, ,, var. **fernandopoensis,** N. E. Br.	257
,, longiflora, Gér. & Labr.	... 256
,, **metallica,** Gér. & Labr.	... 245
,, ,, var. **longituba,** N. E. Br.	247
,, ,, var. **nyasica,** N. E. Br.	247
,, **nilotica,** Baker	238
,, ,, var. **obscura,** N. E. Br.	238
,, nobilis, Godefr.-Leb.	... 251
,, paniculata, Schinz.	... 259
,, **parva,** N. E. Br. ...	232, 233
Sansevieria patens, N. E. Br.	... 210
,, **Pearsonii,** N. E. Br.	... 216
,, **Perrotii,** Warb. ...	... 206
,, **Phillipsiae,** N. E Br.	... 203
,, **polyphylla,** Haw.	... 259
,, **Powellii,** N. E. Br.	... 198
,, pumila, Haw. ...	... 231
,, **pumila,** De Spin ...	231, 259
,, **Raffillii,** N. E. Br.	... 252
,, ,, var. **glauca,** N. E. Br.	252
,, **rhodesiana,** N. E. Br.	... 212
,, **robusta,** N. E. Br.	... 207
,, **rorida,** N. E. Br. ...	... 205
,, rosea, Dietr. ...	... 260
,, Roxburghiana, Hook. f.	... 230
,, **Roxburghiana,** Schult.	... 227
,, rufocincta, Baker ...	... 250
,, sarmentosa, Jacq. ...	... 260
,, Schimperi, Baker ...	... 225
,, **senegambica,** Baker	... 235
,, sessiliflora, Ker. ...	... 260
,, **singularis,** N. E. Br.	... 222
,, **sordida,** N. E. Br.	... 214
,, spicata, Haw. ...	... 249
,, **stenophylla,** Link	... 260
,, **striata,** Don ...	... 260
,, **Stuckyi,** Godefr.-Leb.	... 219
,, **subspicata,** Baker	... 234
,, **subtilis,** N. E. Br.	... 237
,, **suffruticosa,** N. E. Br.	... 202
,, sulcata, Baker & others	... 225
,, **sulcata,** Bojer ...	... 223
,, **thyrsiflora,** Thunb. ...	249
,, **trifasciata,** Prain	... 239
,, ,, var. **Laurentii,** N. E. Br.	... 240
,, **varians,** N. E. Br.	... 209
,, **venosa,** Don ...	... 260
,, **Volkensii,** Gürke ...	... 226
,, **zanzibarica,** Gér. & Labr.	206
,, zebrina, Gent. ...	... 240
,, zeylanica, Hort. ...	... 209
,, zeylanica, Redoute	... 230
,, zeylanica, Roxb. ...	... 228
,, **zeylanica,** Willd.	226, 229
Schieckia flavescens, Maury	... 258

XXII.—MISCELLANEOUS NOTES.

Mr. William Broadhurst Brierley, M.Sc. of the University of Manchester, has been appointed by the President of the Board of Agriculture and Fisheries a First Class Assistant in the Plant Pathology Laboratory of the Royal Botanic Gardens, Kew.

Hugo Mueller.—The death of Dr. Hugo Müller, F.R.S., which took place in his 82nd year, at his country house at Camberley, Surrey, on 23rd May, 1915, has deprived Kew of an attached and sympathetic friend. By education and profession a chemist, Dr. Müller was a man of wide interests. His botanical knowledge, which was extensive both on the systematic and on the economic side—perhaps his most important published work is "Die Pflanzenfaser und ihre Aufbereitung für die Technik"—led to the formation of close and mutually helpful ties between

him and this institution. His interest in matters botanical led to work in two rather different fields. His exceptional knowledge of species and his great skill as a gardener enabled him to satisfy his keen artistic sense by bringing out all the beauty of the components of his collection of living plants, and at the same time to indulge in his scientific desire to become master of their distinctive characters and of their habits under cultivation. In addition, however, to his love of plants for their own sake, he was much interested in their economic properties and in the chemical nature of their principles. It was, perhaps, to the latter rather than to the former taste that his correspondence with Kew during the past forty years owed its inception, though during this period it shows how keen was his interest in all branches of the work done here. More than forty years ago Kew was able to assist him with material to serve in his search for Quercite (*Kew Rep.*, 1876, p. 29); later, to supply or help him to procure material needed in his efforts to determine whether the presence of lactic acid in the vegetable world can be accepted as a fact; and again in connection with the interesting series of investigations involved in the separation and study of Cocosite, on which he was engaged during 1880–85, to which subject he returned twenty years later. One of the latest subjects of this kind to occupy his attention was the colour of Ebony wood; to help him in this research, which the outbreak of the war induced him to postpone, he received from Kew a series of samples of the various Ebonies in August, 1914. In return, Kew was indebted to Dr. Müller for help and information on many subjects, such as Ngai Camphor; vegetable "wax;" the principle of the Raiz del Piptizahuac (*Dumerilia Humboldtiana*). With his assent and the permission of the Treasury, his report on the occurrence of Natural Sugar in Tobacco, a fiscal question to the investigation of which he gave his co-operation in 1883, was published in this work (*K.B.* 1896, p. 49). At his instance Kew elucidated the origin of Indian Yellow (*K.B.* 1890, p. 45), and to him we were indebted for a valuable note on Synthetic Indigo (*K.B.* 1898, p. 34). The museums owe to his kindness samples of interesting substances like the Salep, which is used only by the Jews of Whitechapel, who make from it the decoction they term "sloop," and use as a beverage like tea or coffee. Another gift of this kind is a specimen of Bocca, the root of *Tabernanthe Iboga*, used and highly valued on the Lower Congo as a febrifuge. On the garden side his kindness was equally manifest; sometimes as a chemist, as when he devised for our use an ink which could be satisfactorily used for writing on zinc garden labels; again, as an economic botanist, as when he supplied for cultivation the root of what was understood to be the true Asafoetida; or as a gardening enthusiast, as when he generously spared for the rockery at Kew a share of the spoils of summer visits to Switzerland and the Tyrol, and of the rarer seeds ripened in his own garden at Camberley.

In at least one case his two somewhat different botanical interests were mutually helpful. One of his most recent, and, in its results, most striking investigations had as its subject the "farina" met with in many species of the genus *Primula*, which he found to consist of flavone.

To his wide knowledge were added great kindness and a singular charm of manner; nowhere can his loss be more keenly felt or more sincerely mourned than at Kew.

Sir Arthur H. Church, K.C.V.O., F.R.S.—By the death of Sir Arthur Church, on 31st May, 1915, in his 81st year, Kew has lost a near neighbour and a most generous friend.

Though Sir Arthur Church's name is perhaps best known for his researches into the chemistry of pigments and in mineralogical chemistry, he was also an authority on agricultural chemistry, and had a wide knowledge of the chemistry of plants. His interest in the agricultural and botanical side of his subject was stimulated, no doubt, by his appointment to the chair of Chemistry at the Royal Agricultural College, Cirencester, in 1863, where Sir William Thiselton-Dyer subsequently became his colleague as Professor of Natural History.

The friendship then begun was strengthened when Sir William took up his duties at the Royal Gardens, for Sir Arthur Church came to reside in the neighbourhood on his appointment to the Professorship of Chemistry at the Royal Academy in 1879, and his relations with Kew from that time onwards have been of the most friendly and cordial nature. It is not in our province to speak of his chemical work, which was always ingenious and refined, but it must not be forgotten that it led him to devise methods for the preservation of such national treasures as the stonework of Westminster Abbey and the ceiling of Greenwich Hospital.

Among his contributions to agriculture and botany, the more important are the English edition of Johnson's "How Crops Grow" (with Sir W. T. Thiselton-Dyer), "The Food Grains of India," and his memoirs on vegetable albinism, colein or erythrophyll and aluminium in vascular cryptogams. He also devised an ingenious method of measuring the transpiration current by means of Lithia.

He was an admirable artist, and there are at the Herbarium some beautiful illustrations of British Ferns by his hand. In connection with his charming book on Japanese sword-guards, he was at great pains to determine accurately the plants represented.

The Royal Gardens are indebted to Sir Arthur Church for many generous gifts, one of particular interest and value being the beautiful colour print of Linnaeus, which he presented last year (*K.B.*, 1914, p. 138).

By many members of the Gardens' staff he will be missed for his unobtrusive readiness to help those in distress and sickness.

"Though many things be changed,
And some forgot;
Friends lost and friends estranged,
Forget me not!"*

Robert Woodward, Jr.—To dendrology in this country the loss of Robert Woodward is a great one. Unlike the majority of

* The Forget-me-not. Flower Posies. A. H. Church. 1890. (Privately published).

country gentlemen he acquired the love of trees and shrubs whilst he was still a youth. In the ordinary course of things he would, had he been spared, have become the owner of one of the finest collections of trees in the country. This collection, situated in the grounds of his home at Arley Castle, near Bewdley, was founded by Lord Mountnorris about 1800. It had been Mr. Woodward's endeavour during the last ten or twelve years to enlarge it by the addition of new and rare species. To this end he supported the later expeditions of Mr. Wilson to China, and was an ardent student of the new plants introduced. In 1907, Mr. Woodward had printed privately the *Hortus Arleyensis*, a list of the trees and shrubs grown at Arley, with their dimensions, site and history. Not only to residents of Arley, but to visitors there also, this little work is of great interest. It gives particulars of several trees which are the finest of their kind in the British Isles, and the records printed of the recent plantings will become increasingly valuable as time goes on. This little work seems to have revived the fashion of printing records of private collections, for since its appearance several others have appeared.

Mr. Woodward also published *The Planter's Notebook*, a pocket volume designed for the use of planters who desired to record and have for easy reference particulars respecting the individual trees and shrubs in their collections.

At Kew Mr. Woodward will be greatly missed. He was a frequent visitor, and his charming nature made him a great favourite with all with whom he came in contact.

At the outbreak of the war he received his commission in the 1st South Wales Borderers. He was killed in action in Northern France on May 9th, in the 37th year of his age.

The Pathological Laboratory.—A laboratory for the exclusive investigation of problems in plant pathology has been equipped at the Royal Botanic Gardens, Kew, and work is now in progress. The laboratory has been formed by the alteration of two Georgian cottages facing Kew Green.

A considerable amount of the Board's pathological work has been carried out at Kew in the past in the Jodrell Laboratory, but owing to the increasing importance of the work it has been deemed necessary to establish a separate institute with its own staff of Plant Pathologists. In the new laboratory the attention of the staff will be devoted primarily to the investigation of diseases of plants caused by fungi both at home and in our Colonies, and special research will be undertaken in connection with important problems in plant pathology.

For the present the Board's Entomologist is also accommodated in the laboratory, so that opportunity will be also afforded for the investigation of plant diseases caused by insects.

The staff of the new laboratory connected with the Royal Botanic Gardens consists at present of two First Class Assistants, who are directly responsible to the Director, a Temporary Technical Assistant, and a Preparer. A Second Class Assistant will shortly be appointed.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 6] [1915

XXIII.—CONIFEROUS TIMBERS.

The European Pines; their Commercial Importance and their Relationship to British Forestry.

W. Dallimore.

Nine species of the genus *Pinus* are natives of Europe, one of them being found wild in the British Isles. They are not all confined to Europe, however, for several occur also in Asia, the cold-resisting kinds extending into Siberia, whilst some of the southern species are found in Asia Minor. *P. canariensis*, from the Canary Islands, may also be included in the group, for so far as geographical affinities are concerned, it can be dealt with more appropriately here than with either the Asiatic or American species.

The species are:—

P. Brutia, Tenore.
P. canariensis, C. Smith.
P. Cembra, Linnaeus.
P. halepensis, Miller.
P. Laricio, Poiret.
P. montana, Miller.
P. Peuke, Grisebach.
P. Pinaster, Solander.
P. Pinea, Linnaeus.
P. sylvestris, Linnaeus.

They vary a good deal in habit, and also in their economic importance. Some grow into large trees 100–150 feet high, whilst others are medium-sized trees or even shrubs, and, although some species are included amongst the most important coniferous timber trees, little more than local value is attached to other kinds. Similar remarks are applicable to their use in forestry, for although three or four species are planted extensively either in the British Isles or on the Continent, the usefulness of others is confined to certain positions where local conditions demand particular species.

P. Brutia, *Tenore.*—*P. pyrenaica*, Lapeyr., *P. halepensis* var. *Brutia*, Calabrian Pine, Pin Mazaron and Pin Pinceau.

This is found wild in south-eastern Europe and in Asia Minor, especially on the Taurus and Lebanon Mountains. In general appearance it is very like *P. halepensis*, but differs in the direction taken by the cones; in *P. Brutia* they point forwards.

(3942.) Wt. 153–601. 1,125. 7/15. J.T.&S. G. 14.

and in *P. halepensis* backwards on the branches. For other particulars see *P. halepensis*. It was introduced to the British Isles in 1836, but is of no great importance here either for ornament or profit. Elwes and Henry, "Trees of Great Britain and Ireland," V., p. 1103, refer to its being planted in Afghanistan and Persia, but it does not appear to have been used to any great extent for forest planting. The timber is said to be of good quality, and to be used for general carpentry work in the eastern Mediterranean region.

P. canariensis, *C. Smith.*—Canary Pine, Téa Wood.

This is a large-growing tree, native of the Canary Islands, where it still forms forests in La Palma (Sprague and Hutchinson, *K.B.*, 1913, p. 294), although many large areas have been denuded of trees. Its leaves are often about 6 inches long, sometimes much longer, slender, very glaucous on young plants, produced in bundles of three leaves each enclosed at the base by a sheath about $\frac{3}{4}$ inch long. The cones vary in size, often being as much as 9 inches long and 3 inches wide, bright brown in colour. They remain on the branches for several years without liberating their seeds, and point towards the base of the branch upon which they are borne. The wood is used largely for building purposes in the Canary Islands, but the supply is not plentiful enough for its influence to be felt upon the timber market. Heart-wood and sapwood are very distinct, the former being known as téa wood and credited with great durability. A section in Museum No. III. at Kew, contributed by Mr. A. K. Bovill in 1901, was taken from the beam of a wine press at Garrachico, Tenerife, which was built more than two centuries ago and had stood out in the open during the whole of that time. The wood is now perfectly sound and very heavy (68 lbs. 3 oz. to the cubic foot). It has a somewhat similar appearance to the heart-wood of *P. Laricio*, and is peculiar from the fact that the rings of autumn wood are almost as wide as those of the summer wood. *P. canariensis* is not hardy in the British Isles, but it has been found useful in S. Africa and elsewhere for sylvicultural purposes.

P. Cembra, *Linn.*—Swiss Pine, Swiss Stone Pine, Alpine Pine, Arolla Pine, Siberian Pine, Siberian Cedar, Pin Alviez, Pin Tinier.

This species inhabits two distinct regions, the Alps of Central Europe and N. E. Russia and Siberia. Loudon established two varieties, calling the one from Central Europe *helvetica* and the other *sibirica*. The first name fell into disuse long ago, but the other is still used as the Siberian tree is considered to be taller and of more rapid growth with a denser and more pyramidal outline than the other, but there the distinctive characters cease, and for all practical purposes the trees from both regions are identical.

The easily recognised characters of *P. Cembra* are its pyramidal outline when young; close growth with a dense brownish pubescence on the younger shoots; dense leafage, the leaves being dark green with two greyish lines on the inner surface, up to 4 inches long, arranged in bundles of five, and often retained for

four or five years; rather large, persistent, brown scales about the bases of the leaves; and short, thick, ovoid cones, 2 to 3 inches long, which do not open and liberate the seeds when ripe as is the case with other five-leaved pines. The cones usually fall intact, and the seeds are liberated by the rotting of the scales or by birds or animals in search of food.

In Central Europe it is usually met with at altitudes of 5000–7000 feet, and in various parts of Switzerland it is used up to 8000 feet for protective works, where the cold and exposure is too severe for common spruce and Scots pine. Under favourable conditions it attains a height of 70–80 feet, with a trunk diameter of $1\frac{1}{2}$–2 feet. Isolated trees may sometimes be much larger in girth, and Elwes and Henry, l.c. pp. 1037–8, refer to a tree growing at Muotta da Celerina near Pontresina at an elevation of 2120 metres which measures 15 to 16 metres in height with a girth of 4·20 metres, and another tree growing behind the Findelen Hotel on the Riffel Alp is recorded as being 25 feet in girth. The last example has been estimated to be between 1000 and 1100 years old. The species is conspicuous on the Swiss Alps between St. Moritz and Pontresina. When growing in close woods a considerable portion of bare trunk is found, but whenever the trees are but moderately dense side branches occur quite low on the trunks. The timber is often very knotty, the knots measuring 1–2 inches in diameter, but it has a good reputation for strength, and the better qualities are in demand for structural work. Very knotty wood is sometimes cut into boards and used for panelling rooms, either quite plain or varnished, whilst clean wood is valuable for carving. In Eastern Russia and Siberia it grows 120–130 feet high with a clear trunk of 60–80 feet, and the timber is said to be less knotty than that grown in Switzerland. There is an export business in this timber from some of the North Russian ports. In both Siberia and Switzerland the seeds are used for food.

Although *P. Cembra* was introduced to the British Isles in 1746 really fine examples are uncommon, very few specimens being on record which have attained a height of 70 feet or more. As a young tree it is much used for ornamental planting, but it does not give entire satisfaction in the south and rarely bears cones freely. In Scotland it cones regularly, but even there it does not appear to have a commercial future. Experimental plantings have been made here and there, notably at Balmoral, but so far the results do not appear to warrant extensive plantations. It is possible that throughout the British Isles it misses the decided winter's rest that it gets in a state of nature.

Planks from ornamental trees grown in this country show the knotty character which is often such a pronounced feature of Swiss wood. A thoroughly dry specimen of the wood in Museum No. IV., grown in Lincolnshire, weighs 27 lb. to the cubic foot.

P. halepensis, *Miller.*—Aleppo Pine, Jerusalem Pine. Pin Blanc, Pin d'Alep, Pin de Jerusalem.

This species was introduced to the British Isles by Bishop Compton in 1683, but owing to the climate it has not become a

common tree. Possibly the best example in the country is growing in Miss Talbot's garden at Margam, S. Wales; it exceeds 70 feet in height and is 10 feet 1 inch in girth at breast high. Under favourable conditions in its native country it is said to attain a height of 80 feet with a girth of 12–14 feet, and to have an average life of 250 years. It is widely distributed through the Mediterranean region from Spain to Asia Minor, N. Africa and the Mediterranean Islands. In its eastern range it is mixed with *P. Brutia* and *P. Laricio*, and in the west with the latter species and *P. Pinea*. According to Elwes and Henry, l.c. p. 1101, it grows as a timber tree in the Balearic Isles up to 3200 feet; and 700 feet higher it is a mere bush. It is found in forests of considerable extent, particularly on the Island of Iviza, where it is the chief component of a forest of 16,000 acres. In Cyprus it is said to be a finer tree than *P. Laricio*.

It has given satisfactory results for sylvicultural purposes in certain warm temperate countries where the rainfall is limited, as, for instance, S. Africa and Spain. H.M. Consul at Malaga, "Diplomatic and Consular Report, No. 4360," 1908, Annual Series, pp. 13–14, refers to its successful planting on poor, waste, sandy land on the shores of the Mediterranean to the east of Malaga. Year-old plants were planted from pots. After two years in the ground they were 4 feet high; after three years in the ground they were 7 feet high and 3 inches in diameter, whilst those that had been planted five years were from $11\frac{1}{2}$–13 feet high and 5–$5\frac{1}{2}$ inches in diameter. The rainfall for the year 1908 was $8\frac{1}{2}$ inches.

The principal distinguishing characters of *P. halepensis* are, young shoots glaucous green; terminal buds $\frac{1}{3}$–$\frac{1}{2}$ inch long; leaves in pairs enclosed by a short sheath which persists until the leaves fall, usually at the end of the second year, slender, dark green, $2\frac{1}{2}$–4 inches long; cones solitary, in pairs, or in whorls of three, $2\frac{1}{2}$–3 inches long, conical, broad at the base, narrowing rather rapidly towards the apex and pointing towards the base of the branch on which they occur; they usually remain intact upon the branches for several years. The timber has a good reputation and is used extensively for general work in the Mediterranean region.

P. Laricio, *Poiret.*—Corsican Pine.

This important species is widely distributed in S. Europe from Spain to the Crimea and Caucasus and in Asia Minor to the Taurus Mountains. It varies a good deal in habit, particularly in height and in the density of the branch and leaf systems, and there are several distinct varieties. The typical Corsican tree is 120–150 feet in height with a girth of from 12–20 feet. Young trees in this country are usually very straight with the whorls of branches widely separated, often $1\frac{1}{2}$–2 feet apart, the branches being small in diameter and comparatively short, so giving the trees a fastigiate appearance. The heads of old trees, however, have a distinct tendency to widen and become flat. The leaves are in pairs, dark green, 4–6 inches long, remaining on the tree 3 or 4 years, enclosed by a sheath $\frac{1}{2}$ inch

long, which remains intact until the leaves fall; cones small, 2–3 inches long, little more than an inch wide, opening and shedding their seed the spring after they ripen; winter buds ½–1 inch long.

It is said to have been introduced to the British Isles about 1759, and a fine old tree a century old is to be seen near the Main Gate at Kew. This tree is 95 feet high and 9 feet 5 inches in girth at 5 feet above the ground. There are also fine examples in other parts of the country, notably at Holkham Hall, Norfolk. On the Holkham Estate, the Corsican pine has been used for more than half a century for planting on sand dunes quite close to the sea, and it has been found to be an excellent subject for the purpose; not only has it grown well in exposed places, but it has reproduced itself in quantity from self-sown seeds. Unfortunately the wood matures very slowly, little heart-wood being formed until the trees are approaching their full size. A transverse section of timber in the Kew Museums, which was grown in Hungary, measures in different directions 2 feet 1½ inches and 2 feet 4 inches in diameter, and shows 246 annual rings. The heart-wood is irregular in outline, but at its greatest width only measures 16½ inches, in another direction it measures 13½ inches across, the annual rings of heart-wood in one case numbering 104 and in the other 82. The heart-wood is a deep reddish-brown and the sap-wood is yellowish in colour. Fast grown timber from Holkham is shown in Museum No. IV. at Kew. A plank 2 feet 3¾ inches wide, showing 53 annual rings, has only 9 inches of heart-wood, and that is confined to 13 years' growth. The same peculiarity has been noticed in other places notably in Yorkshire on Lord Wharncliffe's Wortley Hall Estate, where about 1,000,000 Corsican, and the closely allied Austrian, pines have been planted. When the original plantations were formed it was thought that the thinnings could be disposed of profitably in the neighbourhood for pit props, but when at the age of 17 years a thinning was undertaken, the timber was condemned for props because of lack of heart-wood and the necessary strength. *K.B.*, 1910, p. 14. The Corsican pine has also been planted extensively in North Wales, where it grows rapidly, but is disposed to produce rather coarse timber. The best piece of British grown Corsican pinewood in the Kew Museums is a small section cut from a branch of the old tree at Kew. Its close annual rings indicate slow growth and there is a good development of heart-wood. That particular specimen weighs, excluding fractions. 41 lbs. a cubic foot, and a specimen from Holkham grown on the sand dunes weighs 31 lbs. a cubic foot. Timber grown in the Mediterranean region has a good reputation and is in considerable demand there for general constructive work and other uses for which good pine timber is required. It would, therefore, appear that the tree is well worth planting widely in poor soils and in exposed situations, particularly near the sea, and in positions where it can be grown on a long rotation system, or in places where it can be marketed in a young state for inferior kinds of work, but it would be little use to expect first-rate prices for young, fast-grown trees. In

natural forests the tree is considered to be at its best for felling between 250 and 300 years of age. Moderately close planting is advisable, for trees grown wide apart are inclined to produce coarse timber. A point which is strongly in favour of the extended planting of Corsican pine is its practical immunity from attack by rabbits. The species has been tapped for resin, but with little success in comparison to other kinds. Next to the Scots pine it is the most profitable pine to plant under forest conditions in this country.

P. Laricio var. **nigricans,** *Parl.* (var. *austriaca Endl.*).—Austrian Pine.

Of the several varieties of *P. Laricio* this is most widely grown. It is easily distinguished by its dense branch system and heavy leafage, the leaves remaining on the trees for 4 or 5 years. It produces coarse timber of little value in this country, but is invaluable for purposes of shelter and is often used for protection in exposed positions. The branches are retained to the ground line, and trees which are exposed to the full fury of winds direct from the sea develop as sturdy, heavily-branched bushes or small trees, forming excellent protection for more useful timber trees in the background.

P. montana, *Miller.*—Mountain Pine.

This is a low-growing bushy species from the mountains of Central and southern Europe. It varies a good deal in habit, but is usually from 3–12 feet in height. A small economic value attaches to it as a source of pine oil, but its principal value to the forester is for planting on exposed land at a high elevation to provide shelter for young trees of more important species. The variety *uncinata,* however, has some value as a timber tree. It is found in the eastern and central Pyrenees, the French Alps, and in restricted areas in Switzerland, as a tree often 60–80 or sometimes 100 feet high, with a girth which may be as much as 8 or 9 feet. In the Pyrenees it occurs at elevations of 5000–8000 feet and withstands a considerable amount of wind and cold. For this reason it is being planted in exposed positions in the Highlands of Scotland where other trees fail.

P. montana produces its leaves in pairs. They are 2–2½ inches long, arranged closely on the branches and are enclosed at the base by a short sheath. The cones are from 1–2 inches long and rarely more than an inch wide.

P. Peuke, *Grisebach.*—Macedonian Pine.

This has been spoken of as the European counterpart of the Bhotan pine or Himalayan blue pine (*P. excelsa,* Wall.), but the two trees are distinct in general characters. Its region of distribution is almost limited to Macedonia, Bulgaria, and Montenegro. Elwes and Henry, l.c., p. 1015, refer to it as growing 100 feet high with a girth of 5–7 feet in Bulgaria, but its average height appears to be 70–80 feet, a height that it will probably attain in the British Isles, although it is of slower growth than several other European pines. Its branch system is more compact than that of *P. excelsa,* and the tree has a stiffer and more

pyramidal outline. The leaves are borne in bundles of five and remain in good condition for about three years. They are usually about 4 inches long, stiffer in appearance than those of *P. excelsa*, and densely arranged about the points of the branches. The cylindrical cones are 4–6 inches long and 1½–2 inches in diameter, resinous, expanding when ripe and liberating the seeds, but remaining on the trees for several months afterwards. It agrees with *P. excelsa* in having the young wood shining and glabrous.

Although it grows fairly well as an ornamental tree in this country it does not appear to have been tried for forest planting. In some Continental countries, however, there seems to be a disposition to substitute it for the Weymouth pine (*P. Strobus*, Linn.) where the latter tree suffers from the attacks of pine aphis. The timber of *P. Peuke* is used for building purposes in its native country, but it does not affect the timber market elsewhere.

P. Pinaster, *Solander.*—Maritime Pine, Seaside Pine, Cluster Pine, Pin à Trochet, Pin de Bordeaux, Pin des Landes, Pin Grand, Pin Maritime, Tree of Gold.

This species is widely distributed in the Mediterranean region from Spain to Greece, where, under the most favourable conditions, it forms a fine tree 100–120 feet high with a girth of 12–14 feet. It is conspicuous by reason of its thick, reddish-brown bark, long, stout leaves, and large, woody cones. The leaves are in pairs, each 5–6 inches long, enclosed at the base by a sheath up to an inch in length which remains intact during the life of the leaves, usually about three years. The mature cones are bright brown, 4–7 inches long and 1½–2½ inches wide, often remaining unopen upon the tree for several years after the seeds are ripe. They may be borne singly, two or three together, or in large clusters. Although the timber is not of a first-rate quality, it is used for building purposes, street paving, railway sleepers and telegraph poles, and is in great demand for pit props. Perhaps the chief economic use of the tree, however, is as a source of resin and turpentine, French resin and turpentine being derived largely, if not entirely, from this species. It is used in the manufacture of artificial camphor, colours, etc., and the dry products principally in the manufacture of soap, paper, varnishes, linoleum, electric cables, distillation of oils and other purposes.

It grows well in various parts of England, particularly in the southern maritime counties, where it withstands considerable exposure to winds. Numerous finely developed trees are to be found on exposed cliffs at Mount Edgcumbe, whilst shelter provided by this tree and *Cupressus macrocarpa* makes it possible to cultivate many tender exotics successfully in the Scilly Islands. It has been planted on sand dunes in some places, and a vigorous young plantation exists quite close to the shore on the Margam Estate near Port Talbot. When fully exposed to rough winds it develops with a dense, bushy habit, height growth being comparatively slow, but where the effects of shelter are felt, fairly rapid growth in height is maintained.

In south-west France the value of this species is well known, and the story of the conversion of an almost barren tract of land

into valuable forest is full of interest. The present area of the forests of maritime pine in this region is computed to be about 2,500,000 acres; in 1892 it was given as 1,715,000 acres, and in 1855 as 50,000 acres. The value of the forests in 1904, according to Mr. Huffel, was £18,000,000; the annual revenue obtained by the sale of timber, turpentine and resin being £560,000, or 7s. per acre. Owing to recent improvements in transport, such as construction of light railways, the annual returns have considerably increased.*

Recent particulars of the forest area have been given by Mr. Consul Rowley in his Report on the Trade and Commerce of the Consular District of Bordeaux for the year 1912,† from which the following extracts are taken:—

"The area covered at the present time by pine forests in south-west France is about 2,500,000 acres. According to the age of the trees the land is valued at from £4 15s. 6d. per hectare ($2\frac{1}{2}$ acres) for two-year old trees to £76 per hectare for trees 40 years old, and £80 per hectare for trees 70 years old. In the year 1835 the same land was worth about 30s. per hectare.

"In the early part of the Nineteenth Century this area, more especially that part known as the Landes, was nothing more than a marshy, partly treeless waste, covered with a low dense growth. It was originally damp, unhealthy and sparsely inhabited on account of the immense sand dunes lined up along the shores of the Bay of Biscay, which, due to their constant trend inward, swallowed up trees, villages and forests, and obstructed the rivers and inlets. Water could not drain away and in the end flooded large areas, which turned into stagnant, pestilential fever marshes. The damage by the moving sand became so bad that the Government officials had to devise and execute plans for reafforesting the whole area. The ownership of the land is divided into three groups—1. Belonging to Government. 2. Belonging to departments or townships. 3. Belonging to private owners.

"The forests belonging to the State are divided into 15 sections and are very carefully worked.

"In the first section are placed seedlings; in the second, 5-year old trees; in the third, 10-year old trees, and so on in periods of 5 years up to 50 years. No tapping is done in the first four sections; in the sixth, seventh and eighth sections the trees are thinned by bleeding some of them to death, and in the thirteenth, fourteenth and fifteenth sections the trees are bled to their maximum extent without seriously injuring them. In the other sections some trees are bled to death, and others are bled with great care, the objects in view being the thinning of the trees when necessary, and the preservation of healthy permanent trees which are capable of yielding a large and regular supply of crude resin until the final crop is collected when the trees are 70 years old and the ground is cleared for young plants.

* See Elwes and Henry, l.c. p. 1115.

† See "Diplomatic and Consular Report," Annual Series, No. 5080 (France), pp. 17–20, May, 1913.

"February is employed in selecting the trees for tapping, the minimum girth of permanent trees chosen for the purpose being about 1·10 metres at an average height of a man's shoulder from the ground. The first incision is generally made in the side facing east and at the foot of the tree. The first year the tree is cut to a height of about 60 centim., with a width of 0·9 metres and a depth of 0·01 metres. A piece of zinc is placed at the foot of the cut to guide the resin into a pot which is tied at the foot of the tree. The second and following years the cut is made about 65 centim. high, but diminished in width to 0·8 metres for the second year and 0·7 for the third year, 0·6 metres for the fourth and fifth years. By the end of the fourth year the cut is about 8 feet high. The tree is then allowed to rest for three years, when another incision is made on the north-west side and the same procedure followed as described above. When the trees are to be bled to death, three or four cuts are made simultaneously on the trunk. Each cut is said to produce 3·3 lbs. of resin per year. (The process of bleeding the trees and collecting the resin is well illustrated by specimens in Museum No. III. at Kew.)

"Six crops are gathered each year in the months of April, May, June, July, September, October and November. The last crop is the most abundant, but its product is of inferior quality, the gum only yielding 15–16 per cent. of turpentine as compared to 21–24 per cent. obtained from the first crop. It is calculated that in the Landes about 231,000,000 lbs. of resinous products are obtained yearly, furnishing, after distillation, some 132,000 fifty-gallon barrels of turpentine weighing 7 lbs. to the gallon, and 185,000,000 lbs. of dry product, *i.e.*, 340,000 barrels of 480 lbs. of resin, the balance being composed of inferior stuff, waste, &c. In 1912 about £1 7s. 6d. a cwt. was obtained for turpentine, and about 15s. a cwt. for the best grades of resin. France exports about 63,000 fifty-gallon casks of turpentine and 197,000 barrels of 480 lbs. each of resinous products. Bordeaux and Bayonne being the principal ports of export. In 1912 the United Kingdom took 1147 tons of turpentine and 17,636 tons of resinous products."

In addition there is a big lumber industry. Small trees, after being bled to death, are used as pit props and 363,130 tons at prices ranging from 12s. 8d. to 18s. 3d. per ton were imported into the United Kingdom, chiefly to Bristol Channel ports, in 1912. The average free-on-board price at Bordeaux in 1912 was 16s. a ton, and the average freight from that port was 7s. a ton. In the *Timber News* for March 20th, 1915, Messrs. Osbeck and Co., Ltd., pitwood merchants, Cardiff, say that the normal import of mining timber into the Cardiff district amounts to 1,750,000 tons per annum, and that the war price has been below 20s. a ton ex-ship there. Some of this amount is from Scandinavia, the rest is from France. By an interchange of coal and pit props colliers are able to carry a full load each way which tends to lessen freight rates. Timber of this pine is also used for railway sleepers, paving blocks, and telegraph poles. The price of sleepers is about 2s. 8d. each. Clean timber is also cut up into

boards and other building material, whilst a market is found for the tops, all waste wood being of value for fuel.

The pit prop, turpentine and resin trade accounts for about 51 per cent. of the total export trade of Bordeaux.

P. Pinaster has been planted with success in South Africa, and it is suitable for planting on dunes and other sandy areas in countries where severe frosts are not experienced. It should be planted permanently whilst quite small, 9 inches to 1½ feet high, for, as is the case with most other pines, there is often considerable loss when larger trees are transplanted.

P. Pinea, *Linn.*—Stone, "Timbers of Commerce," pp. 277–278, enumerates the following common names for this pine:—Stone Pine, Italian Stone Pine, Umbrella Pine, White Pine, Black Pine, Mountain Pine, Double Spruce, Pin Pignon. Pin Bon, Pin de Pierre, Pin France, Pin Pinier, Pinie. It is also known as Pin Cultivé.

The species is widely distributed in the Mediterranean region, especially from Spain to Italy. Under favourable conditions it may grow 100 feet high with a girth of from 15 to 20 feet. In the open it is often found with a short, thick trunk and a wide-spreading, rounded head. Its dark green leaves are in pairs 4–5 inches long enclosed by a sheath at the base about ½ inch in length. The cones are solitary, erect, 4–6 inches long and 3–4 inches wide. They are very hard and woody and take three years to mature. They then remain on the branches for several years before the scales open. When collected they are opened by the application of heat. The scales of very old cones have been known to rot whilst the cones were still on the branches and the seeds have commenced to germinate amongst the decaying scales. The leaves bear a resemblance to those of *P. Pinaster*, but the cones are quite distinct. In Italy the tree is grown for the sake of its seeds, which are eaten both raw and roasted. Its timber is used locally for general carpentry work and bears a resemblance to that of *P. Pinaster*, the quality of the two being rather similar.

In this country it grows from 40–60 feet high and forms a handsome decorative tree, but it has no value for commercial planting. In South Africa it is planted under silvicultural conditions, with, it is reported, fairly satisfactory results.

P. sylvestris, *Linn.*—Scots Pine, Scotch Pine, Scotch Fir. Wild Pine, Pin Sylvestre, Sapin rouge du Nord, Bois rouge du Nord, Pin de Hagenau, Pin a'Mature, Pin Sauvage, Pin d'Ecorse, Pin de Geneve, Pin d'Auvergne, Pin Blanc d'Autriche, Gemeine Kiefer Fohre, Forle, Forche, Kichne, Weiss-Kiefer, Redwood, Baltic Redwood, Red Deal, Yellow Deal, Riga Fir, Memel Fir, Archangel Fir, Petchora Fir, Danzig Fir, Stettin Fir, Norway Fir, Polish Fir, Whitewood.

Pinus sylvestris or its wood may be met with under any one of the above-mentioned names, whilst new names are constantly appearing, each new port of shipment supplying one or more new names, usually as a prefix to fir or deal. Curiously, the wood is rarely referred to as pine wood by wood workers.

This species is widely distributed through northern and central Europe and north-western Asia, and is the most important coniferous timber of Europe. It is used for all kinds of building purposes, also for railway sleepers, telegraph poles, masts, scaffold poles, fencing, pit timber, paving, the extraction of turpentine and resin, etc. The timber varies a good deal in quality according to the district in which it has been grown. That from N. Russia and Scandinavia is usually regarded as the best, but prejudice may sometimes be the deciding factor, for plenty of good timber is produced in Central Europe, whilst the best of the timber from the old natural forests of Scotland is of excellent quality and probably equal in every respect to that imported from Russia. The best quality of imported timber is usually termed redwood, although the colour hardly warrants the name. It may be yellow in colour or yellow with a reddish tinge, and should be heart-wood of clean grown, well matured trees. Like other vernacular names, however, this one cannot be regarded as a guarantee of timber of one quality, for timber sold as redwood often varies a good deal in character. The wood also varies greatly in weight. As a rule it is between 23 lbs. and 38 lbs. per cubic foot, but some examples have been recorded which weighed scarcely 20 lbs. to the cubic foot, and others have exceeded 50 lbs.

When used for indoor work the best qualities of home-grown and imported wood last for an indefinite period. In some of the old Scottish castles and mansions roof timbers prepared from adjacent forests several centuries ago are still perfectly sound. Out of doors, wood treated with a preservative lasts well, but untreated wood soon decays, especially when in contact with the earth or in places where a free circulation of air is not maintained. Most of the timber used for posts, sleepers and paving blocks is treated with creosote, and as a rule an injection of from 7-9 lbs. to a cubic foot is considered sufficient for all practical purposes. In important thoroughfares, such as "The Strand." the life of creosoted redwood blocks is said to be about 7 years; in other places where traffic is moderately heavy the blocks may be calculated to last for from 12 to 15 years. One instance of the longevity of creosoted deal blocks, when subjected to exceedingly heavy wear, is Westminster Bridge, where blocks were in continuous use for 13 years. The life and utility of the blocks, however, does not depend entirely upon the quality of the wood and the amount of creosote it contains, but is partly determined by the quality of the bed upon which the blocks are laid and the filling and surfacing material that is used. An uneven bed or inferior concrete results in the blocks being pressed into the concrete, thus creating an uneven surface and exposing their edges to damp. Unequal filling of the crevices also allows moisture to lodge between the blocks. Railway sleepers and telegraph poles are also creosoted before use, and it is probable that it would pay to creosote scaffold poles, especially parts which are inserted in the ground. A great deal of fencing and material for the erection of farm buildings is also creosoted. Timber placed in a confined atmosphere is subject to dry rot, and even

when the space beneath floors is well ventilated, it is wise to creosote those portions that are built into walls. An idea of the importance of the wood of the Scots Pine in the timber market may be gathered from the figures given for the exports from Riga alone to the United Kingdom in 1912. Under the heading "Boards and Deals," the Board of Trade returns give—" pieces, 1,556,006; boards, 354,999 standards, value £2,464,670," whilst the timber export trade of Russia for 1912 was given as 6,861,887 tons, valued at £16,136,613.*

As already stated, very good pine wood is grown in Scotland, yet the prices obtained by the owners are often unsatisfactory, whilst that wood which is far removed from a manufacturing centre is heavily handicapped by transit charges. In fact, although about 4,500,000 tons of pit wood are required in the British Isles each year, British grown wood which is at a considerable distance from the nearest collieries, after cost of cutting and delivery have been deducted from the returns shows scarcely any margin for rent of ground and profit, so cheaply can foreign grown wood be supplied. Nevertheless, the Scots Pine is the most important pine for sylvicultural purposes in the British Isles at the present time and with improved methods of cultivation and marketing, prices will doubtless have an upward tendency.

Pinus sylvestris forms a tree up to 140 or 150 feet in height with a trunk diameter of from 1–3½ feet. The grey or glaucous-green leaves are 2–3 inches long, produced in pairs, rather broad in comparison to the length, and usually flat and slightly twisted. The cones are small, greyish, 1½–2 inches long, and nearly an inch wide. It grows well in light, dry, sandy soil and withstands considerable exposure. In one or two places in Scotland it is found at an altitude of nearly 2000 feet as a fair-sized tree, but as a rule the limit of its usefulness as a timber tree is reached between 1000 and 1500 feet.

On the Continent resin and other resinous products are obtained from the wood, but in Great Britain the Scots Pine is grown simply for its timber.

In Museum No. IV. at Kew an exhibit is made of timber grown in some of the principal forests of Scotland, and workers in pine wood would do well to compare the quality of the timber with that imported from foreign countries.

* See "Diplomatic and Consular Report," Annual Series, No. 5197 (Russia), p. 8. September, 1913.

XXIV.—WALTER HOOD FITCH, BOTANICAL ARTIST, 1817-1892.

W. Botting Hemsley.

Appreciative obituary notices of this talented artist are numerous,* and the high quality of the productions of his facile pencil is universally recognised in the botanical world; but few persons have any idea of the quantity and variety of his work, as no systematic and comprehensive record exists. An attempt at such follows below, and if it is not absolutely complete it is believed that no important contribution of his to the illustration of the vegetable kingdom has been omitted. That minor works exist to which we have no clue is possible, or even probable, because many of these appeared anonymously. Fitch was both artist and lithographer, so that his plates express his own conceptions and meanings. Much of his early work for Sir William Hooker's publications is unsigned. On this point Fitch himself informed the writer that Sir William invariably signed his own drawings, that the signatures of correspondents were always appended to their contributions, and that he himself was responsible for all the unsigned plates in the Botanical Magazine, Icones Plantarum, Kew Journal of Botany, etc., from 1834 onward. Sir William Hooker was himself an accomplished botanical artist, but his style is quite different from the bolder Fitchian style, his drawings being characterised by their more delicate and detailed finish. Biographically it will be sufficient to mention that our artist possessed a natural taste for drawing in early years, which soon developed into executive ability, and brought him employment in the factory of a Glasgow firm of calico printers, where Sir William Hooker discovered him and ransomed his indentures of apprenticeship. Under so able an instructor as Sir William, Fitch soon became proficient and even his early work revealed the artistic power of a genius. His career as a botanical artist commenced in October, 1834, with plate 3353 (*Mimulus roseus*), of the Botanical Magazine. It would be superfluous to enter into particulars of his progress to maturity, and his merits as an artist; his pencil always reveals the master hand. Nevertheless a few words of appreciation from the pen of his early patron are appropriately reproduced here. In his preface to Bauer's illustrations of the "Genera Filicum" Sir William Hooker says: "They have all been executed under my own eye in zincography by a young artist, W. Fitch, with a delicacy and accuracy which I trust will not discredit the figures from which they were taken." This was in 1842. Sixty years later, Sir Joseph Hooker, in the sketch of his father's life, refers to Fitch in terms of unstinted praise as one "who by his artistic talents contributed so largely to the value of my father's work." Fitch accompanied Sir William Hooker to Kew on his taking up

* See The Gardeners' Chronicle, Jan. 23, 1892; Journal of Botany, 1892, with portrait.

the Directorship, and during his long active career, practically every illustrated publication, official or unofficial, issued from Kew was adorned by his pencil. He was also a prolific contributor to the leading horticultural publications, but on this point the list which follows is eloquent. It is also evidence that Fitch must have been a rapid delineator. The production of the admirable and elegant little wood-cut illustrations of Bentham's "Handbook of the British Flora," and the "Lilies" of Elwes's monograph, afford excellent examples of his methods of drawing. In a standing position, with a block in one hand and a pencil in the other, he drew without hesitation, and with a rapidity and dexterity that was simply marvellous. The lilies he drew also in a standing position direct on the stone, which was posed at a slight angle. The bold freehand lines were laid on with an unerring sweep of the pencil. This was in 1880, when he was no longer in his prime. Fitch ceased illustrating the Botanical Magazine and other semi-official Kew publications in 1877. He continued producing, however, so far as his health permitted, up till about 1888. Prominent among his latest productions are the 110 beautiful plates illustrating the Botany of Salvin and Godman's "Biologia Centrali-Americana," 1879–1888. These plates, like so many of his, were prepared from dried specimens, and as a revivifier of herbarium specimens Fitch has never been surpassed, and perhaps never equalled. He was also as ready in adapting inferior drawings; witness the magnificent "Illustrations of Himalayan Plants." From time to time Fitch executed sets of excellent diagrams for lecturing purposes, though details of what he accomplished in this direction are wanting.

The Kew collection of drawings and published figures of plants includes a very large number of Fitch's original drawings, both published and unpublished. Among the latter, many intended for the "Botanical Magazine," and the prematurely discontinued "Refugium Botanicum." The British Museum also possesses, Dr. Rendle kindly reports, some of Fitch's original drawings, including studies for the plates of the *Victoria regia*.

Fitch received few distinctions, as there is no corporation that recognises the merits of botanical artists. Sir Joseph Hooker gave the name *Fitchia* to a very striking Pacific Islands genus of arboreus *Compositae* in 1845, and he dedicated the ninety-fifth volume of the Botanical Magazine to the "accomplished artist and lithographer of 2500 plates" of that publication, in 1869. From 1880 Fitch was the recipient of a Civil List pension of £100 a year, in recognition of his services to botanical science.

A rough approximate of the total of the published drawings, as tabulated below, is 9600, and doubtless reached 10,000, counting plates illustrating more than one species and diagrams and large folding plates containing many figures. Upwards of 5300 of these are coloured, ranging from the octavos of the "Botanical Magazine," the quartos of the Botany of Ross's Antarctic Voyage, and the folios of the Himalayan flora, to the elephant folio of the *Victoria regia*.

The compiler of the ensuing bibliography has received much assistance from the family of the deceased artist, and his thanks

are specially due to Miss Fitch, who extracted the statistics to a large extent, and followed up the clues afforded by the scanty existing correspondence.

Separate Publications.

General.

The Botany of Captain Beechey's Voyage (W. J. Hooker and G. A. Walker Arnott). 1830 1841. Ninety-nine plates; 38 signed by W. J. Hooker; 61 by W. H. Fitch, unsigned.

The British Flora (W. J. Hooker). Many illustrated editions, coloured and uncoloured. Fourth edition, 1838. Four plates. Fifth edition, 1842. Twelve plates.

The British Flora (W. J. Hooker and G. A. Walker Arnott). Successive editions of Hooker's Flora, mostly the same illustrations repeated. Altogether eight editions.

Letter to Dawson Turner on the death of the Duke of Bedford (W. J. Hooker). 1840. Coloured plate of *Bedfordia salicina*.

The Botany of the Voyage of H.M.S. "Herald" (B. Seemann). 1841–1855. One hundred plates; ten from drawings by J. D. Hooker; the rest by Fitch.

The Botany of Ross's Antarctic Voyage—Flora Antarctica; Flora Novae Zelandiae; Flora Tasmaniae (J. D. Hooker). Six quarto volumes. 1844-1860. Five hundred and twenty-eight plates, mostly drawn (or finished), and all lithographed by W. H. Fitch. There are coloured and uncoloured editions of the whole work.

Guide to the Royal Botanic Gardens, Kew (W. J. Hooker). 1847–1862. Twenty-one editions, averaging about 60 figures in text.

Niger Flora (W. J. Hooker). 1849. About fifty uncoloured plates; nearly all by W. H. Fitch.

Sikkim Rhododendrons (W. J. Hooker). 1849–1851. Thirty coloured plates, developed by W. H. Fitch from J. D. Hooker's original sketches.

Forest Trees (Mary Roberts). 1850. Twenty coloured plates.

Victoria Regia (W. H. Fitch). 1851. The descriptions by W. J. Hooker. Four coloured plates.

Palm Trees of the Amazon (A. R. Wallace). 1853. Forty-eight uncoloured plates lithographed by W. H. Fitch.

Popular Economic Botany (T. C. Archer). 1853. Twenty coloured plates, containing 102 figures. An abridgment of the same followed in 1854.

Himalayan Plants (J. D. Hooker). 1855. Pictorial title-page and thirty coloured plates. Re-drawn from native originals by W. H. Fitch.

Popular Garden Botany (Agnes Catlow). 1855. Twenty coloured plates.

A History of the Vegetable Kingdom (W. Rhind). 1857. Eighteen coloured plates and two engravings from W. H. Fitch's drawings.

Nueva Quinologia of Pavon (J. E. Howard). 1862. Twenty-seven coloured plates.

Field Botanist's Companion (T. Moore). 1862. Twenty-four coloured plates.

The Cedars of Lebanon (J. D. Hooker). Natural History Review, vol. ii. 1862. Three uncoloured plates.

Handbook of the British Flora, illustrated (G. Bentham). 1863. Twelve hundred and ninety-five figures in text.

Handbook of the Dublin Botanic Garden (D. Moore). 1865. Thirty-four woodcuts.

Flora Vitiensis (B. Seemann). 1865–1873. Ninety-seven coloured plates.

Illustrated London Almanac. 1866. Twelve wood engravings; flowers of the months.

Disease in Orchids, etc. (M. J. Berkeley). Journal of the Horticultural Society. 1866. Four uncoloured plates.

The Treasury of Botany (J. Lindley and T. Moore). 1862. Two hundred and sixty woodcuts in text.

Imperial Bible Dictionary (P. Fairbairn). 1866, 1888. Fifty-five and sixty woodcuts in text.

British Grasses (Margaret Plues). 1867. Sixteen coloured plates and 100 figures in text.

Quinology of East Indian Plantations (J. E. Howard). 1869–1876. Thirteen coloured and two uncoloured plates.

Domestic Botany (J. Smith). 1871 and 1883. Sixteen uncoloured plates and 14 woodcuts in text.

Guide to the Royal Botanic Gardens, Kew (D. Oliver). 1872–1885. Ten editions, averaging 54 figures in text.

Lahore to Yarkand (G. Henderson and A. O. Hume). 1873. Six coloured plates.

Illustrations of the Forest Flora of North-West and Central India (D. Brandis). 1874. Seventy uncoloured plates.

Bible Plants (J. Smith). 1877. Ten uncoloured plates.

Le Dessin Appliqué à la Botanique (W. H. Fitch). 1877. About 20 figures. Translation by Professor Edouard Morren from the Gardeners' Chronicle of 1869.

Biologia Centrali-Americana: Botany (W. Botting Hemsley). Five volumes. 1879–1888. One hundred and ten plates; a few coloured, constructed from Mrs. Salvin's paintings.

Peruvian Bark (C. Markham). 1880. Two figures from Howard's Quinologia of Pavon.

The Genus Lilium (H. J. Elwes). 1880. Forty-eight coloured plates.

Matabele Land and the Victoria Falls (F. Oates). 1881. Two coloured plates.

Botany of the Challenger Expedition (W. Botting Hemsley). 1885. Sixty-five uncoloured plates, eight of which by W. H. Fitch.

Botany of Socotra (I. B. Balfour). 1888. One hundred uncoloured plates; fifteen by W. H. F.

Flora and Fauna of Sinai, etc., Palestine Exploration (H. C. Hart). 1891. Nine uncoloured plates.

Two Poisonous Plants: Journal of the Agricultural Society (W. Carruthers). 1898. Two woodcuts reproduced from Bentham's Handbook of the British Flora.

Illustrated Bible Treasury (W. Wright). 1899. Fifty-three woodcuts in text, from Fairbairn's Dictionary of the Bible.

Orchids.

A Century of Orchidaceous Plants (W. J. Hooker). 1849. One hundred coloured plates.

Select Orchidaceous Plants (R. Warner). 1862-1878. Eighty coloured plates.

A Second Century of Orchidaceous Plants (J. Bateman). 1867. One hundred coloured plates.

Odontoglossum (J. Bateman). 1874. Thirty coloured plates.

Ferns.

Genera Filicum (W. J. Hooker). 1842. One hundred and twenty coloured plates, zincographed by W. H. Fitch from Francis Bauer's drawings.

Species Filicum (W. J. Hooker). 1846-1864. Three hundred and four uncoloured plates.

A Century of Ferns (W. J. Hooker). 1854. One hundred coloured plates.

A Popular History of British Ferns (T. Moore). 1857. Twenty coloured plates.

Filices Exoticae (W. J. Hooker). 1857–1859. One hundred coloured plates.

The British Ferns (W. J. Hooker). 1861. Sixty-six coloured plates.

Garden Ferns (W. J. Hooker). 1862. Sixty-four coloured plates.

Index Filicum (T. Moore). 1857–1862. Thirty uncoloured plates.

British Ferns (B. Seemann). 1860. Forty-eight coloured figures in one large plate.

A Second Century of Ferns (W. J. Hooker). 1861. One hundred coloured plates.

Ferns British and Foreign (J. Smith). 1866. One uncoloured plate and 164 figures in text.

British Ferns (Margaret Plues). 1866. Sixteen coloured plates and 56 figures in text.

Synopsis Filicum (W. J. Hooker and J. G. Baker). 1868. Nine plates containing 98 figures. Coloured and uncoloured editions.

Historia Filicum (J. Smith). 1875. Thirty uncoloured plates.

Mosses, Seaweeds, Fungi, Lichens.

Popular History of Seaweeds (D. Landsborough). 1849. Twenty coloured plates.

Popular History of Lichens (W. L. Lindsay). 1856. Twenty-two coloured plates, lithographed from Lindsay's drawings.

Outlines of British Fungology (M. J. Berkeley). 1860. Twenty-four coloured plates.

Handbook of British Mosses (M. J. Berkeley). 1863. Twenty-four coloured plates.

British Seaweeds (S. O. Gray). 1867. Sixteen coloured plates.

Elementary Botany.

Botanical Illustrations (W. J. Hooker). 1837. Twenty-six uncoloured plates containing 392 figures.

Elementary Botany (D. Oliver). Several editions. 1864–1874. About 200 figures in text.

First Book of Indian Botany (D. Oliver). 1869. Two hundred and forty-two figures in text.

Botanical Diagrams (G. Henslow). 1898. Nine folio sheets, reduced from large diagrams executed for South Kensington about 1874.

Illustrations of Natural Orders (D. Oliver). 1874. One hundred and nine coloured plates.

Botany. Science Primers (J. D. Hooker). 1876. Sixty-eight figures in text.

Society's Publications.

Transactions of the Linnean Society.

Brachynema and Phoxanthus (G. Bentham). Vol. xxii. 1859. Three uncoloured plates.

Henriquezia (G. Bentham). Vol. xxii. 1859. Three uncoloured plates.

Camellia Thea (B. Seemann). Vol. xxii. 1859. Two uncoloured plates.

Balanophoreae (J. D. Hooker). Vol. xxii. 1859. Four coloured and 11 uncoloured plates from J. D. Hooker's drawings.

Pitchers of Nepenthes (J. D. Hooker). Vol. xxii. 1859. Five uncoloured plates.

New Plants of the Malayan Archipelago and Tropical Africa (J. D. Hooker). Vol. xxiii. 1862. Eight uncoloured plates.

Three Oaks of Palestine (J. D. Hooker). Vol. xxiii. 1862. One uncoloured plate from J. D. H.'s drawing.

African Anonaceae (G. Bentham). Vol. xxiii. 1862. Five uncoloured plates.

Fissicalyx and Prioria (G. Bentham). Vol. xxiii. 1862. Two uncoloured plates.

A New Anisophyllea (D. Oliver). Vol. xxiii. 1862. One uncoloured plate and four woodcuts.

Sycopsis (D. Oliver). Vol. xxiii. 1862. One uncoloured plate and four woodcuts.

Prolification in Flowers (M. T. Masters). Vol. xxiii. 1862. One uncoloured plate.

Cassia moschata (D. Hanbury). Vol. xxiv. 1864. One uncoloured plate.

Garcinia yielding Gamboge (D. Hanbury). Vol. xxiv. 1864. One uncoloured plate.

Parasitism of Mistletoe (J. Harley). Vol. xxiv. 1864. Three uncoloured plates from J. Harley's drawings.

British Fungi (J. Currey). Vol. xxiv. 1864. One coloured plate.

Welwitschia (J. D. Hooker). Vol. xxiv. 1864. Eleven plates, partly coloured, and partly from J. D. H.'s drawings.

Walleria (J. Kirk). Vol. xxiv. 1864. One uncoloured plate.

Palms of West Tropical Africa (G. Mann and H. Wendland). Vol. xxiv. 1864. Six uncoloured plates.

Aristolochia (J. D. Hooker). Vol. xxv. 1866. One uncoloured plate.

New British Fungi (M. J. Berkeley). Vol. xxv. 1866. One coloured plate.

Hillebrandia (D. Oliver). Vol. xxv. 1866. One uncoloured plate.

Circulation and Formation of Wood in Plants (H. Spencer). Vol. xxv. 1866. One uncoloured plate.

Plants of Anamallay Mountains (R. H. Beddome). Vol. xxv. 1866. Seven uncoloured plates.

Tropical Leguminosae (G. Bentham). Vol. xxv. 1866. Twelve uncoloured plates.

Myostoma (J. Miers). Vol. xxv. 1866. One uncoloured plate.

Lichens of New Zealand (W. L. Lindsay). Vol. xxv. 1866. Four coloured plates from Lindsay's drawings.

Lichens (D. A. Leighton). Vol. xxv. 1866. One coloured plate from Leighton's drawings.

Fungi Angolenses (F. Welwitsch and F. Currey). Vol. xxv. 1866. Four uncoloured plates.

Branched Palms (S. S. Andy). Vol. xxvi. 1870. One uncoloured plate and two woodcuts.

Begoniaceae (D. Oliver). Vol. xxvi. 1870. One uncoloured plate.

Bambusae (W. Munro). Vol. xxvi. 1870. Six uncoloured plates.

New Genera of Plants (D. Oliver). Vol. xxvi. 1870. Three plates from Oliver's drawings.

Lichens (W. L. Lindsay). Vol. xxvi. 1870. Eight partially coloured plates.

Boswellia (G. Birdwood). Vol. xxvii. 1871. Four uncoloured plates.

Cassia (G. Bentham). Vol. xxvii. 1871. Four uncoloured plates.

Lichens of West Greenland (W. L. Lindsay). Vol. xxvii. 1871. Five uncoloured plates from Lindsay's drawings.

Sertum Angolense (F. Welwitsch). Vol. xxvii. 1871. Twenty-six uncoloured plates.

Melastomaceae (J. Triana). Vol. xxviii. 1873. Seven uncoloured plates from Triana's drawings.

Plants of Speke and Grant's Expedition (D. Oliver). Vol. xxix. 1875. Eighteen uncoloured plates.

Orchids Collected by E. Parish (H. G. Reichenbach). Vol. xxx. 1875. Six uncoloured plates from Parish's drawings.

Ferns of British Sikkim (J. Scott). Vol. xxx. 1875. Eighteen uncoloured plates.

Mimosae (G. Bentham). Vol. xxx. 1875. Five uncoloured plates.

Central African Plants (C. de Ficalho and W. P. Hiern). Vol. ii. series 2, 1881-1887. Four uncoloured plates.

New Cycas (W. T. T. Dyer). Vol. ii. series 2 1881–1887. One uncoloured plate.

Plants of Kilima-Njaro (D. Oliver). Vol. ii. series 2, 1881–1889. Three uncoloured plates.

Transactions of the Botanical Society of Edinburgh.

Lepidodendron and Calamites (W. Carruthers). 1866. Two uncoloured plates.

Botany of Socotra (I. B. Balfour). 1888. Seventeen uncoloured plates.

Serials and Periodicals.

Botanical Magazine (W. J. and J. D. Hooker). 1834–1877. About 2900 coloured plates. Plates 6353–6357 and 6389 (1878) also bear Fitch's initials. The original drawings are in the Kew collection.

The Journal of Botany (W. J. Hooker). 1834–1840. Thirty-five uncoloured unsigned plates.

Companion to the Botanical Magazine (W. J. Hooker). 1835–1836. Twenty-six partially coloured plates.

Icones Plantarum (W. J. and J. D. Hooker, and others). 1837–1876. Four hundred and eighty-five uncoloured plates. All of the unsigned plates of this period are by W. H. Fitch.

The London Journal of Botany (W. J. Hooker). 1842–1848. One hundred and forty plates.

The Journal of Botany and Kew Garden Miscellany (W. J. Hooker). 1849–1857. Eighty uncoloured and 22 coloured plates and eight reproductions.

Bonplandia (B. Seemann). 1853–1862. Eleven coloured and two uncoloured plates.

Floral Magazine (T. Moore). i. 1861. Sixty-four coloured plates.

The Florist and Pomologist (R. Hogg and others). 1862–1884. Two hundred and twenty-three coloured plates.

The Journal of Botany (B. Seemann and others). 1863–1876. Thirty-nine coloured and twelve uncoloured plates.

The Gardeners' Chronicle, 1869–1883.

W. H. Fitch's contributions to the *Gardeners' Chronicle* are of a varied character, and difficult to estimate in relation to number. Apparently the first (1869) was a series of Lessons on Botanical Drawing, illustrated by about a score of figures. Then followed, scattered through a number of volumes, a series of some thirty-two full-page illustrations, uncoloured. There is also a collection of handsome supplemental folio coloured plates, representing groups of Orchids, Camellias, Gladioluses, Tulips, Lilies, Calceolarias, Roses, Plums, etc., and pictorial coloured Almanacs for the years 1879 to 1883, or thereabout—altogether perhaps about twenty-five.

Journal of Horticulture and Cottage Gardener. Maiden-hair Fern, 1879. One figure in text.

XXV.—THE GENUS PHELIPAEA.

O. Stapf.

(With Plate.)

The revision of this genus, which includes some of the most brilliantly coloured phanerogamic parasites of the Oriental flora, was suggested by the flowering of one of its members *P. foliata*, Lamb., in the rock garden at Kew in the summer of last year. It has demonstrated the existence of at least three distinct species, diagnoses of which are given below. At the same time the history of the genus itself with its varying definitions and name changes is remarkable enough to be put on record more fully than by the mere references usually given under the headings "literature" and "synonymy." Thanks to the courtesy of M. Gustave Beauverd, it has also been possible to account for those specimens which were mentioned by Boissier in his Flora Orientalis, but are not represented at Kew, and thus practically to complete the enumeration of all the more important stations where *Phelipaea* has been found.

History of the genus.—The genus *Phelipaea* or *Phelypaea*—the author himself spelt it both ways—was published by Tournefort in his "Corollarium Institutionum Rei Herbariae (p. 47) in 1703. It comprised two species, viz., "*Phelipaea orientalis, flore coccineo*" and "*Phelipaea lusitanica, flore luteo*"; but the description was drawn up and illustrated (tab. 479) from the former only, so that "*Phelipaea orientalis flore coccineo*" must be taken as the basis of Tournefort's genus. The author does not indicate the country whence this *Phelipaea* came, but Desfontaines, in Choix de Plantes du Corollaire de Tournefort (1808) p. 18, states that it is a native of Armenia, and the excellent figure published in the same volume from a drawing by Aubriet, the artist who accompanied Tournefort on his journey to the Levant, leaves no doubt that it is the species which has since repeatedly been collected in the neighbourhood of Erzerum, where Tournefort stayed and collected from June 15 to July 6, 1701, just the time when the plant would have been in flower. The paragraph containing the dedication of the genus runs "Phelypaea ab Illustrissima Phelypaeorum Gente, ex qua tot prodiere Regni administri, quos inter maxime conspiciendi summus ille Galliarum Cancellarius Ludovicus Phelypeaux et Hieronymus Phelipeaux Rei Navalis Praefectus, huius aevi Myecenates, etc." The Phelipeaux—or, more correctly, Phelypeaux*—were an old French family which for generations was prominently connected with the legal profession, and gave France more than one eminent administrator. One of them, Louis Phelypeaux, Count de Pontchartrain (1643-1727), was in Tournefort's time Controlor General and Minister of Marine, and since 1699 Secretary of State. He had charge of the Academies, and in this capacity moved his sovereign, Louis XIV., to "send abroad into foreign Countries some Persons that were capable of making

* See Rouy in Bull. Soc. Bot. France, vol. lvi. (1909) p. 50.

pertinent Observations, not only upon the natural History and the old and new Geography of those Parts, but likewise in relation to the Commerce, Religion and Manners of the different People inhabiting there."* Tournefort was appointed leader of the expedition, and the details were arranged between him and Louis Phelypeaux. Thus it was that the 22 letters in which the account of the expedition is given were all addressed to Monseigneur the Count de Pontchartrain, and Tournefort was more than justified in dedicating to him one of his most handsome discoveries. Jerome Phelypeaux, whose name is coupled with that of Louis, was the latter's son, and, from 1699, his successor as Minister of Marine. No mention is made of *Phelipaea* in the account of the journey, but this is easily understood when we consider that the letters were written on the journey and not published until 1717—that is, 9 years after the death of the author. The other species referred by Tournefort to *Phelipaea*, viz., "*P. lusitanica, flore luteo*," was recorded by Grisley in his "*Viridarium Lusitanicum*" as early as 1661 under the name "*Orobanche elegantissima verna, flore luteo.*" A drawing and a carbon impression of it marked "D. Tourn. e Portugalia D. Sherard" is in Morison's Herbarium, and a description was published by Bobart in Morison's Plantarum Historia, vol. iii. (1699) p. 502. Whether Tournefort had it from Grisley or collected it himself when in Portugal in 1688, as is most likely, is uncertain. In any case there is no reference to it in his "Institutiones Rei Herbariae" (1700), and its inclusion in *Phelipaea* may have been merely an afterthought or an error due to the haste with which the Corollarium was prepared, there being only five months between Tournefort's return from the Orient and the passing of his paper by the Academy on December 9, 1702. However that may be, the mistake became subsequently the source of much confusion.

The first to continue and even aggravate the error was Linnaeus who in his Species Plantarum (1753) p. 606, reduced Tournefort's two species to varieties of one species which he transferred to *Lathraea* as *L. Phelypaea*, the Portuguese plant standing as the "type" and the oriental as var. β. When towards the end of the 18th century the Russians discovered what we now know to be a congener of Tournefort's *P. orientalis, flore coccineo* they first put it down as *Lathraea Phelypaea* [Güldenstaedt, Reisen d. Russland i. (1737) p. 422 and Pallas Herb.; Georgi, Beschreib. d. Länd. d. Russ. Reich. iii. (1800) p. 1102] but subsequently transferred it to *Orobanche* as *O. coccinea*, assuming that it was identical with Tournefort's Oriental *Phelipaea* [Marschall v. Bieberstein, Tabl. Crim. (1797) p. 8, and Fl. Tauro-Caucas. ii. (1808) p. 84; iii. (1819) p. 418, and Cent. Pl. Rar. Ross. ii. (1832) t. 56] or as *O. Phelipaea* [Marsch. v. Bieb. Beschreib. d. Länd. am Casp. Meer. (1800) App. 179]. Willdenow in Spec. Pl. iii. (1800) p. 354, accepted Marschall's name *O. coccinea* for the Oriental plant, although he had some doubt as to identity of his and Tournefort's species. Meanwhile Desfontaines, in Flora

* Tournefort, Voyage into the Levant (Engl. Transl., 1741) 1, i.

Atlantica ii. (1800) p. 60, had re-established the Tournefortian genus, giving a diagnosis of it and of *P. lutea* (*Phelipaea lusitanica, flore luteo*, Tourn.) and a description of a new species *P. violacea* as well as excellent figures of both of them. No reference was made to the Oriental plant and the generic description was evidently drawn up from the two species mentioned, with which he was, of course, particularly familiar; but in his Choix de Plantes du Corollaire de Tournefort, published originally in the Annales du Museum d'Histoire Naturelle, vol. x. (1807) and separately in 1808, he added it under the name of *P. Tournefortii* with a very full description accompanied by Aubriet's figure and also pointed out certain differences between *Phelipaea* as understood by him and *Lathraea* and *Orobanche*. Poiret, in Encyclopédie Méthodique, vol. v. (1804) pp. 267, 268, had by that time come to a similar conclusion, except that according to him *P. coccinea* (*Orobanche coccinea*, of Marschall and Willdenow) stands as the third species, as he was uncertain about Tournefort's *Phelipaea orientalis, flore coccineo* which he placed curiously enough as a possible synonym under *Phelipaea lutea*. In 1784 Thunberg in Nova Genera Plantarum p. 91, quite independently of Tournefort had established a genus *Phelypaea* on a South African plant, also a parasite but of very different affinity. With Thunberg's and Desfontaines' definitions of *Phelipaea* before him A. L. de Jussieu submitted the two genera to a critical examination the results of which he embodied in a "Mémoire sur le genre Phelipaea de M. Thunberg et sur d'autres plantes qui portent le même nom" in Annales du Museum d'Histoire Naturelle, vol. xii. (1808) pp. 439–447. Having proved the generic identity of Thunberg's *Phelypaea* with Linnaeus' *Cytinus* he proceeds to analyse Desfontaines' genus of the same name with great acuteness and clearness. He, too, points out that Desfontaines drew his characters of the genus in the first place from the two Atlantic species which might or might not be referred to *Orobanche*, whilst his third species, *i.e. Phelipaea Tournefortii* approaches *Aeginetia** and he concludes by saying "il est possible de laisser les deux genres séparés, de conserver *l'aeginetia* de M. Roxburg, et de réserver le nom *phelipaea*, plus ancien, pour la plante de Tournefort et celle de M. Willdenow, formant ou deux espèces ou une seule. De toutes manières, ce nom retranché a la plante de M. Thunberg, peut sans difficulté être restituée a une des plantes de Tournefort, qui le possédoient primitivement." It was therefore Jussieu who for the first time clearly recognised the heterogeneity of Tournefort's genus and reduced it to the original Oriental element on which Tournefort had based his description and illustration of the genus.

Unfortunately no notice was taken of Jussieu's memoir and when Wallroth in 1825 published his "Orobanches Generis

* This was already suggested by Adanson (Famille d. Pl. ii. (1763) 207) who sunk *Aeginetia* in *Phelipaea* and by Lamarck (Encycl. Meth. ii. (1786) 28).

Διασκευη" we find Tournefort's Oriental *Phelipaea* in *Orobanche*, just as in Willdenow's Species Plantarum, but now forming together with the American *Orobanche uniflora* (*Aphyllon uniflorum* of most authors) a distinct "tribus" *Anoplon*, whilst the Portuguese species is described as *Orobanche Phelypaea*, Wallr., and with *Orobanche violacea*, *Orobanche Phelypaea*, *Willd.* and *O. tinctoria*, Forsk. referred to a new "tribus" *Haemodoron*. The very unnatural "tribus" *Anoplon* was raised to generic rank by Reichenbach (Consp. Regn. Veg. 212 b 1828), following which C. A. Meyer in 1831 formed the combination *Anoplon Biebersteinii* (Verzeichn. d. Pflanz. Caucasus, p. 104) with an emended generic diagnosis, evidently adapted to the Caucasian species. Endlicher in Genera Plantarum (1839) p. 727 adopted Reichenbach's view, but finding *Anoplon* already in use in zoology, he changed it into *Anoplanthus*, creating a section *Anblatum* for the reception of the Oriental plant. This barbarous name, a corruption of the German Ohnblatt, he took over from Tournefort (Corr. Inst. p. 48) who, however, had applied it to a totally different plant, possibly a species of *Lathraea*. Walpers then made the combination *Anoplanthus coccineus* in 1844 (Repert vol. iii. p. 481). Reuter in De Candolle's Prodromus vol. xi. (1847) pp. 41–43 followed Endlicher, except in so far as he replaced the name *Anblatum* by *Macranoplon*. The same nomenclature was adopted by Boissier in Flora Orientalis, vol. iv. (1879) p. 494, although Bentham in Bentham and Hooker, Gen. Plant. ii. p. 982, some three years previously had revived Tournefort's genus in the circumscription given to it by Jussieu. Beck in his monograph of *Orobanche* (Bibl. Bot. vol. iv. 1890 p. 58, and in Engler and Prantl's Natürliche Pflanzenfamilien iv. 3 B (1895) 129 also has *Phelipaea* in the same sense. When Wallroth transferred *Phelipaea coccinea* to *Orobanche* and *Anoplon* and separated from it Desfontaines' West-Mediterranean species, placing them in a "tribus" *Haemodoron*, he added that he preferred to drop the name *Phelipaea* as it had already been given to another genus by Thunberg and that *Haemodoron* Theophrastes had priority over it. This group contained *Orobanche violacea* (*Phelipaea violacea*, Desf.), *O. tinctoria and O. Phelypaea* (*Phelipaea lutea*, Desf.), the last two being the species for which Hoffmannegg and Link had established a distinct genus *Cistanche* as early as 1809 (Flore Portugaise, vol. i. p. 319). Subsequently (1830) C. A. Meyer in Ledebour's Flora Altaica, vol. ii. p. 459, connected *Haemodoron* as a section with Wallroth's "tribus" *Trionychon* into a genus for which he claimed the name *Phelipaea*. This arrangement was adopted by Endlicher in his General Plantarum p. 727 and by Reuter in his monograph of *Orobanchaceae* in De Candolle's Prodromus, vol. xi. p. 4, but with this difference that the sectional name *Haemodoron* gave way to *Cistanche*. Boissier too accepted *Phelipaea* in that sense, and it was not until 1890 that the combination *Haemodoron* (*Cistanche*) + *Trionychion* was broken up by G. Beck (in Biol. Bot., vol. iv. p. 56) the latter forming a section of *Orobanche*, the former a distinct genus *Cistanche*. The name

Phelipaea has thus been applied to plants of widely different appearance, such as the brilliant solitary-flowered Phelipaeas of the Orient, the stately Cistanches of the Atlantic flora and the more commonplace Orobanches allied to *O. aegyptiaca*.

The species of Phelipaea.—Tournefort's *P. orientalis, flore coccineo*, was undoubtedly collected in Armenia, most likely in the neighbourhood of Erzerum, and it has since repeatedly been collected near there and in Russian Armenia and Turkish Kurdistan. A second species was discovered by Güldenstedt in 1772 in Kachetia, probably near Tiflis, and subsequently (1796) by Marschall von Bieberstein on the north side of the Caucasus and in Daghestan. It was considered to be identical with Tournefort's plant, and Marschall's name *Orobanche coccinea* was intended to cover the Armenian and Caucasian plant. It is true that Willdenow (Sp. Plant. iii. (1800) p. 354) quoted Tournefort's synonym with a query under *Orobanche coccinea;* but he added "Saltem convenit figura floris Phelypaea in Institutionibus rei herbariae t. 479 exacte cum planta nostra." Poiret four years later (Encycl. Méth. vol. v. p. 268) mentions Tournefort's *Phelipaea orientalis, flore coccineo* (without reference to the figure on t. 479) as a possible synonym of *P. lutea*, but he also says "Je soupçonne que la plante A de Tournefort n'est qu'une variété de celle-ci (*P. lutea*) à fleurs d'un rouge pourpre. Il faudroit d'ailleurs, pour prononcer sur cette espèce, des détails qui nous manquent," and under *P. coccinea* "l'espèce de Tournefort, que nous avons rapportée à la plante précédente, mais avec doute, n'a pas moins de rapports avec celle-ci." Desfontaines, on the other hand, was more definite on this point. He remarks in Choix de plantes du Corollaire (p. 17), "Il est très-douteux que cette plante soit la même quel'*Orobanche coccinea* de M. Willdenow, dont la tige, d'après la description qu'il en a donnée, est garnie de feuilles écartées, et dont les découpures de la corolle ont une forme ovale. Le Phelipaea de Tournefort a les tiges nues et les divisions de la corolle sont circulaires et non ovales." Lambert, in 1810, having examined the Caucasian and Crimean specimens in Pallas' Herbarium, decided that the Armenian and the Russian plants represent two distinct species, for the latter of which he proposed the name *Phelipaea foliata*, and for the former *P. Tournefortii*. In a contribution to the Dictionnaire des Sciences Naturelles, vol. xxxix. (1826) p. 466, Poiret accepted Lambert's view, but claimed the name *coccinea* exclusively for the Caucasian plant in preference to *foliata*. Then in 1831, although aware of Lambert's name, C. A. Meyer (Verzeichn. Pflanz. Cauc. p. 104) introduced yet another name, namely, *Biebersteinii* (*Anoplon Biebersteinii*) which was preserved by Reuter in his monograph of the *Orobanchaceae* in De Candolle's Prodromus vol. xi. (1847) p. 42 (*Anoplanthus Biebersteinii*). Meanwhile Walpers in 1844 had once more united the Armenian and Caucasian plants into one species as *Anoplanthus coccineus*. This view was accepted by Boissier in Flora Orientalis, vol. iv. (1879) p. 494, but with this modification that he at the same time split off the Tournefortian plant as var. *pedunculuris* and a form collected by

Haussknecht in Persian Kurdistan as var. *nigrorittatus;* but his conception of what might be called "typical" *Anoplanthus coccineus* and in the first place was intended to represent the Caucasian plant was vitiated by the inclusion of material from Western and Southern Asia Minor, which, as will be shown below, belongs to a third and hitherto undescribed species. Finally in 1904, Bornmüller in Bull. Herb. Boissier, 2nd sér. vol. iv. p. 687, went back to Marschall's (and Walper's) view of the identity of the Armenian and Caucasian plants, adopting Poiret's combination *Phelipaea coccinea*, and including under it the whole of the specimens quoted by Boissier.

Considering the confusion connected with the name *coccinea*, it seems to be best to drop it altogether and accept for the two old species the names proposed by Desfontaines and Lambert, that is *Phelipaea Tournefortii* and *P. foliata*. The third and new species, to which allusion has already been made, was described as var. *Boissieri* of *Anoplanthus Biebersteinii* by Reuter in DC. Prod. xi. (1847) p. 42, after its discoverer Boissier, and may now be known as *Phelipaea Boissieri*. To it belongs very probably a plant described by Boissier as *Anoplanthus coccineus* var. *nigrorittatus*. See below p. 293.

Definition and bibliography of the species.—The differential characters of the three species which make up the genus Phelipaea are set out in the following key, after which fuller descriptions and bibliographical notes follow:—

Calyx conspicuously 2-lipped, upper lip subentire; corolla lobes round, distinctly imbricate; anthers bearded; pubescence of elongated, gland-tipped hairs; scale leaves more or less congested at the base, distinctly sheathing ... ... 1. *Tournefortii.*

Calyx 5-fid, lobes subequal, the 3 posticous conniving into an upper, the 2 anticous into a lower lip; pubescence of very short gland-tipped hairs; scale leaves more or less scattered, semi-amplexicaul, very rarely the uppermost shortly sheathing.

Corolla lobes round, distinctly imbricate; anthers bearded ... ... 2. *Boissieri.*

Corolla lobes roundish oblong, spreading; anthers glabrous ... ... 3. *foliata.*

1. **P. Tournefortii,** *Desf.*—Caulis sparse vel superne densiuscule fulvo-vel cinereo-glanduloso-pubescens, pilis ad 0·75 mm. longis, quorum cellulis 2 inferioribus 2–4-plo longioribus quam latis. *Squamae* basi congestae, in speciminibus elatis alte vaginante, in nanis abbreviatae, parte libera breviter late ovata subacuta vel subcucullata. *Calyx* campanulatus bilabiatus, 1·5–2·5 cm. longus, tubo 7–10 mm. longo, labis supero latissimo subintegro, infero ad vel ultra medium bifido, lobis oblongis obtusis, totus pube eadem ac caulis interdum densa indutus. *Corollae* tubus latus, leviter curvatus, supra medium oblique ampliatus, 1·5–2·5 cm. longus, extus superne magis minusve glanduloso-pubescens; limbus coccineus, bilabiatus, lobis sub-

aequalibus nisi labii superioris paulo brevioribus, rotundatis obtusissimis vel late subemarginatis 1–2·5 cm. diametro, labio infero ad fauces maculo atro hirsuto in tubum descendente obcordato ornato. *Filamenta* ima basi albo-ciliata, caeterum glabra; antherae mucronatae, albo-barbatae, mucrone dempto 3 4 mm. longis. *Stigma* subbilobo, 3 mm. diametro.

Phelipaea orientalis, flore coccineo, Tournef. Coroll. Instit. R. Herb. (1703) 47; Lam. Encycl. Méth. ii. (1786) 28, in note on *Phelipaea*. *Lathraea Phelypaea*, β, Linn. Spec. Pl. ed. i. (1753) 606; ed. ii. (1763) 844.

Orobanche coccinea, Marsch.-Bieb., Tabl. Prov. entre Terek et Kour (1797) 58, and Fl. Taur. Cauc. ii. (1808) 84; Willd. Spec. Pl. iii. (1808) 354; Wallroth, Orob. Gen. Διασκευη (1825) 68. *O. Phelipaea*, Marsch.-Bieb., Beschreib. Land. Casp. Meere (1800) App. 179. *Phelipaea lutea*, Poir. Encycl. Méth. v. (1804) 268. *?P. coccinea*, Pers. Syst. ii. (1807) 181; all as to syn.

Phelipaea Tournefortii, Desf. in Ann. Mus. Hist. Nat. x. 298 (1807) t. 21, and Choix Pl. Coroll. Tourn. (1808) 16 t. x.; Poir. Encycl. Méth. Suppl. iv. (1816) 392, and in Dict. Sc. Nat. Hist. xxxix. (1826) 466. *Anoplon Tournefortii*, Don, Gen. Syst. iv. (1837) 633. *Anoplanthus coccineus*, Walp. Rep. iii. (1845) 481 (in part). *A. Tournefortii*, Fisch. in Bull. Soc. Nat. Mosc. xxv. (1852) 106; Boiss. et Buhse, Aufzähl. Transkauk. u. Pers. Pfl. (1860) 169; Tchichatcheff, As. Min. ii. (1860) 60. *A. coccineus* var. var. *pedunculoris*, Boiss., Fl. Or. iv. (1879) 494. *A. coccineus* var. *Tournefortii*, Lipsky in Act. Hort. Tifl. iv. (1899) 413. *Phelipaea coccinea*, Bornm. in Bull. Herb. Boiss. sér. 2, iv. (1904) 687, in part.

2. **P. Boissieri**, *Stapf*, sp. nov. Caulis pube eadem ac *P. foliatae*. *Squamae* oblongae, obtusae vel obtussimae, semi-amplexicaules vel raro breviter vaginantes, longitudine valde variae, secundum caulem ad ejus medium dispersae, superiores saepe remotae. *Calyx* campanulatus, subaequaliter 5-lobus, 1·75 3·5 cm. longus, tubo lato 7 10 mm. longo, ob lobos posticos 3 retrorsum et anticos 2 antrorsum approximatos subbilabiatus, lobis oblongis obtusiusculis anticis interdum minute apiculatis, totus magis minusve pube eadem ac caulis indutus. *Corollae* tubus latus, leviter curvatus, 1·7–2·8 cm. longus, supra medium sensim oblique ampliatus, extus tenuiter glanduloso-papillosus (saltem superne), intus antice ex faucibus usque ad staminum insertionem ferrugineo- vel atro-barbatus; limbus coccineus. 2-labiatus, lobis subaequalibus rotundis imbricatis, labii superi (in floribus majoribus) 1·5–2 cm., labii inferi patentis 2-2·5 cm. diametro, labio infero ad fauces maculis binis atris in tubum descendentibus et ibi confluentibus villoso-barbatis ornato. *Filamenta* inferne ciliata; antherae mucronatae, albo-barbatae, 3–4 mm. longae. *Stigma* subintegrum, 4–5 mm. latum.

Anoplanthus Biebersteinii, var. *Boissieri*, Reut. in DC. Prodr. xi. (1847) 42 (excl. Reichenbach's syn.). *A. coccineus*, Boiss. Fl. Or. iv. (1879) 494 (excl. the varieties and the specimens from the Crimea and the Caucasus). *Phelipaea coccinea*, Bornm. l.c. in part.

P. foliata, *Lamb.* (See plate facing p. 294.) Caulis sparse vel superne densiuscule pube minutissima glandulosa atro-rufa indutus, pilis ad 0·25 mm. longis quorum cellulis vix longioribus quam latis. *Squamae* ovato-oblongae, obtusae, semiamplexicaules, longitudine valde variae, secundum caulem ad eius medium dispersae, magis minusve remotae. *Calyx* late campanulatus, inaequaliter 5-lobus, 1·5–3 cm. longus, tubo cupulari 5 (raro ultra) mm. longo, ob lobos posticos 3 retrorsum, anticos 2 antrorsum approximatos subbilabiatus, lobis oblongis vel ovatis obtusis vel acutis, totus magis minusve pube eadem ac caulis indutus. *Corollae* tubus latus, curvatus, 1·5–2·5 cm. longus, supra medium obliquissime ampliatus, extra flavidus, rubro-suffusus et superne tenuiter papillosus, intus antice e faucibus ad staminum insertionem ferrugineo-barbatus; limbus coccineus, 2-labiatus, lobis subaequalibus rotundo-ellipticis vel rotundo-oblongis patentibus obtusis fere 1·5 cm. longis paulo minus latis, labio infero ad fauces maculis binis atris in tubum descendentibus et ibi confluentibus rufo-barbatis ornato. *Filamenta* glabra; antherae mucronatae, 3 mm. longae, glabrae. *Stigma* subintegrum, fere 3 mm. diametro.

Lathraea Phelypaea, Güldenst. Reis. d. Russl. i. (1787) 422; Georgi, l.c. iii. (1800) 1102 and Nachtr. (1802) 281, non Linn. *Orobanche coccinea*, Marsch.-Bieb., Tabl. Prov. entre Terek et Kour (1797) 58; Fl. Tauro-Cauc. ii. (1808) 84 (excl. Tournefort's and Lamarck's syn.); Cent. Pl. Rar. Ross. ii. (1832), t. 56; Willd. Spec. Plant. iii. (1800) 354 (excl. Tournefort's syn.); Wallroth, Orob. Gen. Διασκευη (1825) 68 (excl. Tournefort's and Linnaeus' syn.); Georgi, Beschreib. Russ. R. Nachtr. (1802) 283; Reichenb. Pl. Crit. vii. (1829) 49, t. 699; Steven, Verzeichn. Taur. Pflanz. (1857) 274. *O. Phelipaea*, Marsch.-Bieb., Beschreib. Länd. Casp. Meer. (1800) App. 179 and in Konig and Sims, Ann. Bot. ii. (1806) 447 (excl. syn.). *Phelipaea coccinea*, Poir. Encycl. Méth. v. (1804) 268; Suppl. iv. (1816) 391; Dict. Sc. *Hist. Nat.* xxxix. (1826) 466; Pers. Syn. ii. (1807) 181 (excl. Tournefort's syn.); Bornm. in Bull. Herb. Boiss. sér. 2. iv. (1904) 687, in part. *P. foliata*, Lamb. in Trans. Linn. Soc. x. (1811) 260, t. 7; Hohenack. in Bull. Soc. Nat. Mosc. vi. (1833) 242; O. Stapf. in Bot. Mag. t. 8615. *P. Biebersteinii*, Fisch. ms. ex Wallr. l.c. as syn.

Anoplon Biebersteinii, C. A. Mey., Verzeichn. Pfl. Cauc. (1831) 104; Don, Gen. Syst. iv. (1837) 633; C. Koch in Linnaea xvii. (1843) 290. *A. coccineum*, C. Koch in Linnaea xxii. (1849) 670. *Anoplanthus coccineus*, Walp. Rep. iii. (1844) 481, in part; Ledeb., Fl. Ross. iii. (1847–1849) 324 (excl. certain synonyms). Boiss. Fl. Or. iv. (1879) 494, in part; Arnoldi ex Fedtschenko in Bot. C. Blatt, lxxiii. (1898) 76; Akinfiew, Nördl. Kauk. in Denkschr. Kauk. Abt. Russ. Geogr. Ges. xvi. i. (1893) ex Just. Jahresber. (1894), ii. 211; Thomin, in Act. Hort. Tifl. vi. ii. (1902) 56; Gard. Chron. lv. (1914) 401, fig. 184. *A. Biebersteinii*, Reut. in DC Prod. xi. (1847) 42, excl. var. β; Fisch. in Bull. Soc. Nat. Mosc. xxv. (1852) 105, t. 1; Regel in Gartenfl. (1880) 34, tab. 1000.

A. coccineus, var. *nigrocittatus*, Boiss. [Fl. Or. iv. (1879) 494] belongs very probably to this species. It is known to me only from Boissier's description: "corolla vitta lata nigra obsita"; but M. Beauverd (in a letter) describes it thus: "C'est une plante aussi élevée que les plus grands échantillons Hohenacker: son calice à divisions aiguës mesure 30 mm. long., et sa corolle à tube rétreci à la gorge atteint 60 mm. de longeur; les étamines sont barbues et atteignent le sommet du stigmate qui a 6 mm. de diametre; le nectarostège est disposé en anneau à la hauteur du point d'insertion des filets staminaux et se compose de longs cils d'un pourpre foncé. Les feuilles, nulles à la base, sont éparses tout le long de la tige; à peine amplexicaules, elles mesurent 20+20 mm. dans la partie inférieure de la tige et 20+30 mm. vers le sommet; le haut du pedoncle et l'extérieur du calice offrent la même pubescence rousse et très brièvement glanduleuse du Phelipaea que Kotschy, dans son exsiccata No. 44 (imprimé) nommait β *Boissieri*. Cette variété '*nigrocittatus*,' si elle n'est une espèce autonome (?) se rattacherait plutôt à votre *P. Boissieri*; elle n'est representée ici que par le No. 711 Haussknecht, It. Orient, Pir Omar Gudrum, Juin 1867." 4 ech. bien maltraités par les insectes!

Distribution.—In the following an attempt is made to define the areas of the genus and its species. Unfortunately it is at present impossible to make full use of the material preserved in foreign collections so that the account must necessarily remain incomplete.

1. **P. Tournefortii**, discovered in Armenia, probably in the neighbourhood of Erzerum by Tournefort in 1701.

Specimens seen or recorded. Turkish Armenia: Upper Chorok valley, near Masut, E. of Baibut, 1200–1800 m., *Huet de Pavillon*! Near Erzerum, Zohrab, 826! *Calvert* and *Zohrab*, 158! Kurdistan: without precise locality, *Brant*! *Barre de Lancy* (Hb. Gaillardot, 255). Transcaucasia: Near Pusko in the Dshagri valley, north of Nahitshewan, on *Pyrethrum myriophyllum*, C. A. Mey., *Buhse*.

2. **P. Boissieri**. Discovered by Boissier and Pinard on Mt. Cadmus (Baba Dagh) near Denislu in S.W. Asia Minor in 1842.

Specimens seen or recorded. Asia Minor: Vill. Aidin, Baba Dagh, above Denislu, *Boissier*, *Pinard*. Vil. Adana, in oakwoods in the "Kassan Oglu" Mts. near Gorumse, north of Si, 1200 m., *Kotschy* 44! Syria: On the summit of Djebel Akra (Mons Cassius), 1769 m., *Boissier*. Turkish Armenia: without precise locality, *Sintenis* (1899) No. 406! North of Van, *Maunsell*! Norduz District, *Maunsell*!

Anoplanthus coccineus var. *nigrocittatus* was discovered in 1867 by Haussknecht on the mountain Pir Omar Gudrum, north of Sulimanieh in S.E. Kurdistan. Since then the same variety has been recorded from the following localities: Caucasus, Gouv. Eriwan, St. Evliar, on *Pyrethrum myriophyllum*, Thomin (in Acta Hort. Tiff. vi. II. (1902) 56); Gouv. Karabagh, Lisogorsk, west of Schuschar, *Thomin* l.c. iii. (1899) 65.

3. **P. foliata.** Discovered by Güldenstedt in Kachetia in 1772.

Specimens seen or recorded. Crimea: in the subalpine region (Tchichatcheff) "Sobla" Estate, on the Alma River, *Marschall*; sources of the Salgir River, near Yenisala, on *Centaurea Scabiosa*, *Steven*; without precise locality, *Pallas*, *Arnoldi*. Caucasus: Gouv. Stawropol, between Moskowskoje and Alexandrowsk, *Marschall*; near Stawropol, *Akinfiew*. Terek Territory, near Pjätigorsk, *Hofft*; Constantinogorsk, *C. A. Meyer*; "Caucasian baths," *Conradi*, (acc. to C. Koch); Beshtau Mountain, *Hofft*; on *Centaurea dealbata*, *Peroffsky*, *Hohenacker*; Daghestan and Shirwan, without precise localities, between 1400 and 2100 m., *Marschall*. Gouv. Tiflis: Mzchet, *Thomin*; "Kachetia," *Güldenstedt*; without precise locality, *Steven*! *Wilhelms*! *Hohenacker*! Gouv. Jelisawetpol, near Helenendorf, *Hohenacker*! Mount Sariah, *Hohenacker*. Karabagh, without precise locality, *Hohenacker*. Gouv. Eriwan, "Armenia Rossica," *Szowitz in Herb. Besser* at Kew. Ararat and Alagos, 1300–1525 m. *Wagner* (acc. to Tchichatcheff).

Bornmüller in Bull. Herb. Boiss. sér. 2. iv. (1904) 687, quotes two more localities for "*P. coccinea*"—which as understood by him, would coincide with the genus—namely, Babadagh near Tabriz, and Ateschbeg between Maraga and Takt-i-Soleiman, both in Azerbeidjan, Persia. No specimens of either of the localities have been seen, so that their determination remains for the present uncertain.

The area of the genus may therefore be described as extending from the south-west of Asia Minor to Azerbeidjan and from the Crimea and the outlying hills on the north side of the Caucasus to Northern Syria. Of the three host plants so far recorded, *Centaurea Scabiosa* and *C. dealbata* extend over the whole of the Caucasus region, but in the Crimea only *C. Scabiosa* occurs, whilst neither of them is recorded from the areas of *P. Boissieri* and *P. Tournefortii*, unless they overlap slightly in Turkish Armenia. Similarly *Pyrethrum myriophyllum*, the only host plant known of *P. Boissieri* and *P. Tournefortii*, is almost entirely excluded from the area of *Phelipaea foliata*; but on the other hand it does not quite cover the area of *Phelipaea Boissieri*, as it neither reaches to the Taurus nor the Lebanon system. In Caria Boissier and Pinard are stated (Reuter in DC. Prodr. xi. 42) to have found *Phelipaea Boissieri* growing on a species of *Centaurea*. Boissier's *Anoplanthus coccineus* var. *nigrorittatus* is also said to grow on *Pyrethrum myriophyllum* in Transcaucasia, and both plants have also been collected on Pir Omar Gudrum.

Duration and cultivation.—F. E. L. Fischer, in "Notice sur les Anoplanthus de l'ancien monde" (in Bull. Soc. Nat. Mosc. 1852, pp. 105–108), says that the examination of spirit material collected by Count L. Peroffsky on Beshtau proved the perennial character of the plant, the bosses caused by the action of the parasite on the host showing at the same time flowering stems, scars of the preceding year's growth and buds for the next year (see pl. I.).

PHELLFERA PINNATIFOLIATA.

[To face page 294.

THYRSOPTERIS ELEGANS.

To face page 295.]

Attempts to grow the brilliant parasite have been made repeatedly, but the only instances of successful cultivation, previous to its flowering at Kew, seem to have been those recorded by F. E. L. Fischer l.c. and E. Regel and Poscharsky in Gartenflora, 1880, pp. 34, 35. The former states that a horticulturist at Kharkow succeeded in obtaining a flower out of a ball of earth which he had received from the Caucasus. No particulars of the case are given. Poscharsky, Curator of the Botanic Garden at Dresden, on the other hand, is more explicit. He relates that in 1876 he received specimens of *P. foliata* from C. Koch from the Caucasus, some of which were connected with portions of the host plant (*Centaurea dealbata*), and showed signs of life. They were planted out, and four weeks later the host plant began to sprout. There was, however, no sign of the parasite until June, 1879, when two flowering stems were produced.

The history of the plant grown at Kew and illustrated in the plate accompanying this article is related thus in the text for tab. 8615 of the Botanical Magazine:—

> "The plants on which our figure has been based were grown at Kew from seeds received from the Botanic Garden, Tiflis, in 1911. In this case the host-plant was *Centaurea dealbata*. The seeds of host and parasite were sown together in a pot, but only the *Centaurea* came up. Later, in 1911, the *Centaurea* was planted in the Rock Garden, where it grew alone until, in May, 1914, seven stems of the *Phelipaea*, each bearing a solitary flower-bud, made their appearance, the first bud to open doing so in the middle of the month."

Vernacular names.—**P. Tournefortii.**—Kardush Kâni (Turk. =brother's blood), *Noe*, *Maunsell*.

P. foliata.—Bucha-tschitschegi (Tat. =stallion flower).

XXVI.—THYRSOPTERIS ELEGANS.

L. A. Boodle.

(With Plate.)

Thyrsopteris elegans is a Tree Fern of an interesting type, which is rare in cultivation, and is native only in Juan Fernandez, where it grows in moist and shady woods on the mountains.

The stem is upright, covered with the scars of the old leaves, and may reach a height of 5 feet. The leaves, which form the crown, may be 6 feet or more in length, and the petiole may form half of the length or more. The petiole and rachis are at first clothed with a felt of soft brown hairs among which are interspersed stouter trichomes resembling rather fine bristles. The leaf is pinnately decompound (four to five times pinnate), and is exceptional in being sharply differentiated into sterile and fertile portions, which are quite dissimilar. Some of the lowest pairs of pinnae of the second order, that is those nearest to the rachis, are fertile, and show no expansion of laminar surface in their subdivisions. The ultimate divisions or pinnules, which are there-

fore rachiform, bear the sori terminally, so that each pinnule looks like the stalk of a sorus. The branching of the fertile pinnae, though similar in degree to that of the sterile pinnae, is somewhat contracted, and departs from the horizontal plane in such a way as to assume a thyrsoid character, to which the name of the genus refers.

A cup-like basal indusium invests the sorus, which consists of numerous sporangia covering a prominent receptacle. The sporangium has a continuous, oblique, irregular annulus with no definite stomium. The sporangia are developed on the receptacle in basipetal order.

The genus *Thyrsopteris* was established in 1834 by Kunze* to receive this species, which till then had not been described, though specimens were collected by Bertero in 1830. *Thyrsopteris* was referred by Kunze to the *Cyatheaceae*†, and its affinities are still held to be with certain members of this family. In Hooker's Species Filicum (1846) *Thyrsopteris* was placed next to *Dicksonia*, but in the Synopsis Filicum (Hooker and Baker, 1868) it was transferred to a position next to *Cyathea*, while Diels (in Engler and Prantl, Natürl. Pflanzenfam.) makes a tribe (*Thyrsopterideae*) for it between *Dicksonieae* and *Cyatheae* in the *Cyatheaceae*. Bower‡, who has studied the development of the sorus and sporangium, holds that the characters of *Thyrsopteris* indicate a relationship to *Dicksonia*, though not a very close one, and favours the view that the *Thyrsopterideae* should rank as a separate family. The indusium at an early stage is slightly two-lipped, which is an indication of correspondence with *Dicksonia* (*Cibotium*). A somewhat archaic character is recognised in certain structural features of the annulus.

The occurrence of fertile and sterile tracts of very different appearance on the same leaf, though a rather rare phenomenon, is not restricted to a small phyletic series of Ferns, but is met with again in genera far removed from *Thyrsopteris*, viz.: *Osmunda* and *Aneimia*.

Thyrsopteris is a monotypic genus as regards living plants. Among fossil plants some Ferns of Jurassic, Wealden and Cretaceous age have been referred to this genus by certain authors, but it appears that the data obtained were not sufficient in any of these cases to warrant so precise an identification§.

Ferns form an important constituent of the Flora of Juan Fernandez, the species of Ferns recorded (45) amounting to nearly a third of the vascular plants. Of the Ferns, six besides the *Thyrsopteris elegans* are endemic species.

The large specimen in the Temperate House, a frond of which is illustrated in the accompanying plate, has been at Kew for many years, and its exact history is not on record. It thrives in a mixture of peat and loam placed between rough stones and enjoys a position where it obtains plenty of moisture and some shade.

---

* Kunze, Linnaea, vol. ix, p. 507.

† Bertero appended a note to his specimens as follows :—"*Cyathea*? an potius *Aneimeae* species nova n. 1537."

‡ Bower, The Origin of a Land Flora, 1908, p. 589.

§ See Seward, Fossil Plants, vol. 2. p. 368 etc.

XXVII.—THE SOUTH AFRICAN CAMPHOR TREE.

(*Cryptocarya vacciniifolia*, Stapf.)

O. Stapf.

A tree known in South Africa as "Camphor tree" has recently been received for identification from Mr. I. B. Pole Evans, Chief of the Division of Botany, Department of Agriculture, Pretoria, and proves to be a new species of *Cryptocarya*, closely allied to *C. myrtifolia*, Stapf. The tree was discovered in the Wolf River Forest by Mr. J. D. Keet, Acting Assistant District Forest Officer, and the specimens sent to Kew were accompanied by concise notes, which have been of considerable assistance in drawing up a proper description of the tree, and have furnished the basis of the following information.

The tree is at present known to exist only in the Wolf River Forests and part of the adjoining Schwarzwald Forest, though a few specimens have been found in Flo Forest. It forms a fair percentage of the stocking in Wolf River, and is chiefly confined to ridges, but it may also be found at all elevations between 2500 and 4500 feet. The soil where it flourishes is a deep, rich, red dolerite loam. *Cryptocarya vacciniifolia* forms a tall tree, 80–90 feet high, with clean straight boles up to 60 feet in the best specimens and a diameter at breast height up to $2\frac{1}{2}$ feet. The crowns are dense, well shaped and picturesque. Here and there specimens have outgrown the Yellow-wood, Black Ironwood and other trees, and have their crowns fully exposed to the light. Natural regeneration from seed is fair, and all sizes from the seedling stage are found. Straight and rapid-growing adventitious shoots often form on the stem, and may reach 3 to 4 inches in diameter. The bark of young trees and the higher parts of old stems is dark, and resembles that of Black Bark (*Royena lucida*); ultimately it turns greyish, and is then easily confused with that of large-sized White Pear. The tree flowers profusely; the flowers are inconspicuous, but honey bees visit the tree when in flower in large numbers.

The boles are generally sound and of good shape, but are often somewhat fissured towards the base. There is a perceptible smell of camphor emanating from the leaves, bark, twigs and young wood during the dry season and a few days after felling in the rainy season. The timber is not known to have been put to any use up to the present. It splits easily like Assegai (*Curtisia faginea*) and White Pear (*Apodytes dimidiata*) in the green state, and is straight-grained. It is probably not sufficiently strong to be used for spokes, felloes, or other wagon timber, but it should prove exploitable for furniture.

There were up till now 6 species of *Cryptocarya* known from South Africa, one of them confined to the extreme South-West of Cape Province, the others occurring in Natal and Zululand, except *C. Woodii*, which extends westwards as far as King Williamstown Division. Of most of these very little is known, and the herbarium material extant is extremely scanty. It is therefore very desirable that more attention be paid to these

representatives of *Cryptocarya*, some of which will probably be found to be of economic value. Sim describes the wood of *C. Woodii*, Engl. (*C. acuminata*, Schinz) as hard and close-grained, and mentions another undescribed tree, frequent in E. Pondoland and Natal, which grows up to 60 feet in height and 3 feet in diameter. It is locally known as "Umtungwa," but so far no material has been supplied for scientific examination. It should be kept in mind that the foliage is more or less variable in the same species, according to the age or the parts of the tree. Leaf branches should therefore be collected from young trees, from the flowering region of old trees and from adventitious shoots.

The description of the tree is as follows:—

Cryptocarya vacciniifolia, *Stapf* [Lauraceae]; *C. myrtifoliae*, Stapf, proxima, sed foliis minoribus minus acutis vel obtuse acuminatis supra medium latissimis subtus glaucis paulo brevius petiolatis, floribus et fructibus paulo majoribus distincta.

Arbor circiter 25 m. alta; ramuli juveniles graciles, fulvo-pubescentes, tandem glabrati, cortice nigro tecti. *Folia* obovata vel late obovato-lanceolata, basi subcuneata, apice breviter obtusiuscule acuminata, 2–3 cm. longa, 1–1·4 cm. lata, coriacea, primo utrinque fulvo-pubescentia, cito glabrescentia, tandem pilis paucis subtus circa areolas relictis supra imprimis in costa persistentibus, nervis lateralibus tenuibus utrinque 4–5, reticulatione arctissima supra foveolato-exsculpta; petiolus 2–4 mm. longus. *Paniculae* terminales, 1–1·25 cm. longae, densiusculae, ramulis pauciflоris e foliorum 3 vel 4 proximorum axillis auctae, fulvo-pubescentes; bracteae caducae; bracteolae obsoletae; pedicelli ad 1 mm. longi. *Perianthium* campanulatum, 3·5–4 mm. longum, extus totum fulvo-cinereo-pubescens; receptaculum intus in lineis a staminodiis decurrentibus dense pallide fulvo-tomentosum, caeterum glabrum; segmenta ovato-oblonga, subacuta, intus praeter margines latos tenues minute fulvo-pubescentes. *Staminum* filamenta tenuiter pubescentia; antherae breviter apiculatae; glandulae majusculae, globosae, tenuiter stipitatae. *Pistillum* glabrum. *Fructus* globosus 1–1·3 cm. diametro.

South Africa. Cape Province: King Williamstown Division; Wolf River Forests, *Keet* 1432.

XXVIII.—THE ARBORETUM AT TORTWORTH.

W. J. Bean.

The collection of trees growing in the grounds of Tortworth Court, the home of the Earl of Ducie, has long been known to those interested in trees as one of the finest in the British Isles. It has several claims to distinction. The trees are admirably cultivated, the number of species grown is large, and many rare species are here represented by the finest specimens of their kind in England—often in Europe. There is also an interesting personal factor in the collection being entirely the work of the present Earl of Ducie, who has been an assiduous planter for

sixty or more years. To very few has it been vouchsafed to see such splendid results of their own work. Personally, I know no scene of its type more attractive than that which greets the eye on passing out of the house at Tortworth—smooth, far-spreading lawns, on which are grouped in excellent taste a collection of trees unequalled probably in any private demesne for rarity, diversity and vigour.

The house is situated on an eminence sloping down on one side to a long winding lake bordered by steep, tree-clad slopes, and on the other to a deep ravine with a stream at its base. The grounds occupied by Lord Ducie's trees rest chiefly on two geological formations, the one mountain limestone, the other old red sandstone, the two being divided by the stream just mentioned. There is thus a useful choice of sites. The soil overlaying the sandstone is admirable for ericaceous plants, amongst which a large number of rhododendrons are in great vigour.

Oaks.—Perhaps no genus of trees is so extensively represented at Tortworth as *Quercus*. Unhappily, it has long since ceased to be the fashion to plant exotic oaks, and owing to this neglect nurserymen do not find it worth while to stock representative collections such as one might have found in older days at establishments like that of the Lees of Hammersmith and Isleworth, Smith of Worcester, or Booth of Hamburg. In the greatly revived interest that is being taken in trees now we may hope to see the oaks again planted. The beauty and diversity of their foliage, their often rich autumnal colouring, together with their noble dimensions and their longevity render them very attractive and appropriate ornaments for large gardens and parks. Mr. Vicary Gibbs has got together an extensive collection at Aldenham, but many are yet comparatively small. And at Kew there is a collection unequalled, so far as I know, either at home or abroad in the number of species and varieties, but the Kew soil is too light and dry for oaks as a whole. So that neither at Kew nor at Aldenham do the rarer exotic species show to such advantage as at Tortworth.

Perhaps the rarest of oaks represented at Tortworth is the Japanese *Quercus glauca*, an evergreen species with leaves glossy green above, glaucous white beneath, and about as large as those of Portugal laurel. It is not uncommon to find plants under the name in gardens, but they are nearly always *Q. Vibrayeana*. There are two bushy trees of the true species at Tortworth; they are of rounded habit, the larger one 22 feet through and perhaps as much high, undoubtedly the finest in this country. Another interesting evergreen oak is *Q. agrifolia*, a Californian species of the same type as *Q. Ilex*, but with leaves prickly-toothed and glossy green beneath. A tree at Tortworth, raised from acorns sown in 1879, is now about 35 feet high, 3 feet 9 inches in girth of trunk, and of rather columnar form. *Quercus macedonica* is a rare and distinct oak, deciduous, but usually retaining its leaves until the New Year. It is represented by several plants at Kew, healthy but slow-growing. Lord Ducie's tree is no doubt the largest in England, being now 30 to 35 feet high and 2 feet 11

inches in girth. As indicating the rate of growth at Tortworth, it may be mentioned that in 1907 this tree girthed 1 foot 11 inches. *Quercus Kelloggii* is a handsome oak from Oregon and California, represented here by two fine specimens, one 4 feet 5 inches, the other 4 feet in girth of trunk. Sown in 1879, they are now 50 to 60 feet high, and growing rapidly. There is a smaller tree at Kew from whose acorns young trees have been raised. This interesting tree appears to represent the red oaks in Western North America, having similarly large, deeply lobed leaves, and turning a fine red colour in autumn. Other well-grown American oaks at Tortworth are *Q. palustris*, the pin oak, 6 feet 3 inches in girth, and several *Q. imbricaria*, the shingle oak, about 50 feet high and over 3 feet in girth of trunk. There is a clump of the small-growing *Q. ilicifolia* (syn. *Q. Banisteri*), an oak which produces amazing crops of acorns and has on that account been recommended for pheasant covert. *Q. alba*, the common white oak of the Eastern United States, of which some noble specimens can be seen in the Arnold Arboretum and other suburbs of Boston, Mass., is one of those East American trees which cannot apparently be made to succeed in the British Isles. Lord Ducie has a tree believed to be the largest in the Kingdom, but it is only about 20 feet high and is chiefly remarkable at Tortworth for an obvious lack of vigour amidst so much abounding health.

The two European oaks with finest foliage are *Q. conferta* and *Q. Mirbeckii;* at Tortworth one of several examples of the former has a trunk girthing 6 feet 9 inches, and there is one of *Q. Mirbeckii* 6 feet 3 inches in girth. Lord Ducie finds that this oak grows twice as fast in sand and clay as it does on limestone. There is an interesting hybrid here between *Q. Toza*, a South European species with woolly leaves and young shoots, and our native common oak, *Q. pedunculata;* it is now about 28 feet high. Another European oak received by Lord Ducie as "*Q. serratifolia*" was long a puzzle to botanists; it is now regarded as one of the numerous forms of *Q. lusitanica*. The Valonia oak, *Q. Aegilops*, remarkable for its very large acorns and for the acorn-cups which were once an important article of export from the Levant to this country for tanning purposes, is represented by a tree 40 feet high and 3 feet 5 inches in girth of trunk.

Cupuliferae.—A few notes may be given appropriately here to other members of the Natural Order *Cupuliferae*. There is no tree at Tortworth with a more dainty appearance than *Nothofagus obliqua*, one of the "beeches" from the southern part of South America. Two specimens are in the collection, both raised from the seed introduced from Chile by Mr. H. J. Elwes in 1902; the larger one, a slenderly pyramidal tree of perfect shape, approximately 35 feet high, has a bole clean for about 6 feet at the base, and now 2 feet 1 inch in girth. Although this tree had previously been introduced more than once, it never appears to have become established in gardens, and there is still a possibility that a recurrence of frosts like those of February, 1895, may seriously reduce the number of the trees that at present make so pleasing a feature in many gardens. *Fagus ferruginea*,

although an interesting representative of the genus in North America, has rarely in this country proved worth its room in gardens. Even at Tortworth it makes, like *Quercus alba*, an exception to the general aspect of vigour and health that characterise the tree growth there, although it is one of the best in the Kingdom. It is a low, flat-topped tree with a head of branches 30 feet across and a trunk girthing 3 feet. The North American beech is well distinguished from the European one by its habit of producing suckers from the roots (like an elm) and by the more numerous ribs in each leaf.

Carpinus cordata, a native of China and Japan, has very large leaves for a hornbeam; they are occasionally as much as $5\frac{1}{2}$ inches long by $3\frac{1}{4}$ inches wide, deeply cordate at the base. The species is extremely rare, and except possibly for a tree which grew in the Coombe Wood Nursery, the finest tree in the country is at Tortworth, now about 20 feet high and 10 inches in the circumference of its trunk.

Of alders I noted two fine trees. One of them, *Alnus cordifolia*, perhaps the handsomest of all alders, is over 60 feet high and has a bole 5 feet 9 inches in circumference. An example of the cut-leaved alder, *A. glutinosa* var. *laciniata*, has a trunk 6 feet 6 inches in girth.

A healthy specimen of *Betula papyrifera* has a beautiful white trunk 5 feet 1 inch in girth and is about 45 feet high. Another of *B. Maximowiczii* is probably as good as can be found in Britain. This Japanese species has the largest leaves of all birches, and is a promising tree in this country. Lord Ducie's tree is 2 feet 4 inches in girth and 45 to 50 feet high.

The Golden chestnut.—There is no exotic tree in the Tortworth collection so famous as the Golden chestnut, *Castanopsis chrysophylla*, almost unique among hardy trees for the tawny covering beneath the leaves. This tree, a native of California, is growing on the opposite side of the ravine from the house, on the old red sandstone formation, where it was planted by Lord Ducie almost exactly sixty years ago. It is a shapely, round-topped tree with a smooth trunk. According to Mr. Elwes this tree in 1879 was 20 feet high and 1 foot 5 inches in girth; in 1897 it was 27 feet high and 3 feet in girth of trunk. Since then it appears to have grown more slowly, for fourteen years later (1911) it had only reached 29 feet in height by 3 feet 5 inches, and on May 28 last I made it 3 feet 7 inches in girth, but it seemed to me well over 30 feet high. During the last thirty years it has borne fertile seeds, and many of its progeny are scattered over the country. Several are at Kew, the finest of them standing about forty yards due west of the pagoda at the edge of a bed of heaths; this tree, planted about 1904, is now 18 feet high, its trunk 1 foot 11 inches in girth. It seems to be certain that this *Castanopsis* will not thrive where there is much lime in the soil.

Conifers.—Probably the most striking success among conifers at Tortworth is a tree of *Abies nobilis* planted by Lord Ducie in

1854. In May, 1908, it was 104 feet high by 9 feet 11 inches in girth, but since then its top has been blown off, and it is probably no higher now. Its trunk is 10 feet 7 inches in girth at the present time. There are, however, other fine examples of *Abies nobilis* in our islands, especially in Scotland. Much more interesting to me was a most notable specimen of *Torreya californica* (syn. *T. Myristica*), often called "Californian nutmeg," from the resemblance of its seeds to common nutmegs. This tree is about 35 feet high and about 40 feet in diameter. Its trunk, which girths 5 feet 7 inches, is quite erect and tapering, the side branches spread slightly above the horizontal plane, and the branchlets are perfectly pendulous. This, the finest of Torreyas, was discovered in California by Wm. Lobb in 1851. Of the now comparatively rare *Pinus Sabiniana*, there are two trees, one of them very lofty, and both with the thin, shadeless furnishing of leaves characteristic of this pine. In the bulk of timber they contain the Tortworth trees must be among the most notable in the country. A specimen of the glaucous or silver-leaved variety of Mount Atlas cedar, 60 to 70 feet high and about 40 feet in diameter near the ground, shows how beautiful and effective a tree this is for gardens. According to Lord Ducie, there has been a considerable mortality amongst the deodars planted by him at Tortworth in and subsequent to the year 1854, the reason for which is not very apparent, as those that remain are very healthy and remarkable for their dense heavy masses of foliage. *Larix leptolepis*, the Japanese larch in which foresters are now taking so great an interest, is represented at Tortworth by probably the largest tree of its kind in Britain. It is, I should say, 55 to 60 feet high, its trunk 5 feet 1 inch in girth. *Larix occidentalis*, the North-Western American larch, is also succeeding well. For the drier parts of our islands this is a tree of great promise. Of the beautiful Golden larch of China, *Pseudolarix Fortunei*, there is at Tortworth one of the most notable trees in Britain. I made it 40 feet high and 4 feet 4 inches in girth of trunk. Of *Prumnopitys elegans*, that curious ally of the yew, native of Chile, there is a fine bush about 20 feet high which bears its yellowish white, plum-like fruit. We have lately received at Kew fruits of this taxad from two places in Ireland, but it has not borne them in many places in England. There is a good example of *Juniperus excelsa* about 36 feet high and one of the redwood (Sequoia sempervirens).

Maples.—The genus *Acer* is represented at Tortworth by a collection of remarkably well grown trees. The rare Japanese *Acer nikoense* is perhaps 15 feet high, very shapely and graceful; it is one of the maples with trifoliolate leaves, covered with greyish down, especially beneath. Another uncommon Japanese species, *A. diabolicum*, has a trunk 2 feet in circumference and a rounded head of branches 25 feet in diameter. The specific name is said to refer to the horn-like persistent styles that remain attached to the fruit. The true *Acer pictum* is a native of Japan, but the fine trees at Tortworth grown under the name are probably its Caucasian representative, which is sometimes known as

A. pictum var. *colchicum*, sometimes as *A. laetum*. One of the trees I measured has a rounded head of branches 40 feet in diameter and a short trunk girthing 5 feet 2 inches at its narrowest. *Acer rufinerve*, another Japanese maple, is a very fine tree, probably 35 to 40 feet high, its trunk 2 feet 5 inches in circumference. Its foliage often turns rich crimson before falling. This maple is nearly allied to, and may be regarded as the Japanese representative of, *Acer pennsylvanicum*, a North American species of which also there is a tree at Tortworth of about the same size as regards its trunk. The tree has a peculiar attractiveness in the young wood being striped with conspicuous blue-white jagged lines. There is a good specimen of the rare *A. argutum*, introduced from Japan by Maries in 1881. *Acer spicatum*, introduced from Eastern N. America as long ago as 1750, does not thrive well as a rule in this country, and it is now quite uncommon; but Lord Ducie has it 15 feet high. Very few maples are equal in size of leaf to *A. Volxemi*, and a tree at Tortworth with a trunk nearly 3 feet in circumference has many leaves 12 to 14 inches wide. *Acer Opalus* is not a very rare maple, but there is one of the best in the Kingdom at Tortworth. It has a broad, dense, spreading head of branches and a trunk 6 feet 8 inches in girth.

Lord Ducie has been one of the few to appreciate the merits of the Indian horse-chestnut (*Aesculus indica*). There are several trees thriving well. It is one of the finest of all hardy fine-foliaged trees and is valuable in flowering four or five weeks later than the common horse-chestnut. So far as foliage is concerned, however, no *Aesculus* equals *A. turbinata*, the Japanese species, which is also here in thriving condition. There are five or seven leaflets to each leaf, and the largest of them are as much as 16 inches long by 6 inches wide. The tree, however, is not free-flowering.

Of hickories and walnuts there are some interesting examples. *Carya alba*, the shellbark hickory, has a bole girthing 4 feet, and is already showing the characteristic loose strips of bark. *Carya tomentosa* and *C. sulcata* are both rare, the latter extremely so, but it has borne nuts at Tortworth. One of the most attractive of the walnuts for its foliage is *Juglans rupestris*: it is often a shrub rather than a tree, and here the plant—a bush 30 feet in diameter—is broader than it is high. The leaflets of this species are the smallest among walnuts. *Juglans cinerea*, although introduced (like *J. nigra*) early in the 17th century, is still a very rare tree with us, and is apparently less suited to our climate than the black walnut, but at Tortworth there is a healthy tree with a trunk 3 feet in girth. Allied to the walnuts is the genus *Pterocarya*. *P. caucasica*, is represented by a handsome and shapely tree, not so large as the famous tree at Claremont, but with a trunk 5 feet 10 inches in girth. This is not a common tree in gardens, but very much rarer are *P. rhoifolia* and *P. stenoptera*. Both are in excellent condition here, the former 40 feet, the latter 35 feet high, the trunk of each being 3 ft. 3 inches in circumference.

Of *Tilia euchlora*, a handsome tree is approaching 50 ft. in

height and is 3 ft. 9 in. in girth. In many respects this is the best of all limes. Its branches are rather pendulous and its dark green leaves are remarkably glossy and clean looking. *Cercidiphyllum japonicum*, usually rather disappointing in this country, is 25 ft. high at Tortworth, and thriving. *Cornus controversa* (commonly but erroneously named *C. brachypoda* in gardens) is 20 ft. high, very distinct in its horizontal branching. Of *Acanthopanax ricinifolium*, a remarkable araliad becoming 80 ft. or more high in North Japan, but of which few plants have succeeded for any length of time in England, Lord Ducie has a promising young tree 25 to 30 ft. high, its trunk girthing 23 in. breast high, 3 ft. 1 in. at the base. *Maclura aurantiaca*, the Osage orange, is generally considered to be dioecious, but a tree at Tortworth—the only one there—has borne fruit. *Magnolia acuminata*, the so-called cucumber tree of North America, is represented by a very elegant tree 50 ft. high. Another interesting American tree, the tupelo (*Nyssa sylvatica*), is thriving well with the boggy condition at the root which it affects in its native country. This tree is worth growing for its autumn colour. In the park is probably the best example in Britain of the blue ash (*Fraxinus quadrangulata*) so distinct in its square four-angled stems. Ten years ago this tree was 34 ft. high and 1 ft. 10 in. in girth of trunk. Now it is about 40 ft. high and 2 ft. 8 in. in girth.

For the thorough study of the Arboretum at Tortworth several full days would be needed. The notes on which this paper is based were hurriedly taken during a visit of a few hours on May 28th, 1915. The girths given are correct, but the heights are approximate, there being no time to use a dendrometer. But I tried to avoid the usual fault of exaggerating the stature of the trees.

To conclude, a few words must be given to the celebrated Tortworth chestnut (*Castanea sativa*) now a ruin, but a magnificent and by no means a lifeless one. It stands near the site of old Tortworth Court and the Church. Owing to the rugged and uneven character of its trunk it was not easy to measure accurately, but I made the narrowest girth 51½ ft., equal to about 5½ yards in average diameter. According to legend, King John held council under it, and even in King Stephen's reign Evelyn says it was known as the Great Chestnut of Tortworth. Little is left now but the remains of its gigantic bole, the upper part of which bears a thin furnishing of leaf-bearing branches, and occasional fruits.

XXIX.—THE BLACK OR BERRY-BEARING ALDER FOR GUNPOWDER.

(*Rhamnus Frangula*, L.)

W. Dallimore.

A good many complaints have been made during recent years regarding the poor prices obtained for coppice wood and the difficulty experienced in finding a market for some kinds, yet there are certain coppice woods that are not produced in sufficient quantity to supply the demand, and adequate steps do not appear

to have been taken to replace plantations of unremunerative trees by more promising species.

Rhamnus Frangula is a case in point, for, although wild in the southern parts of the British Isles and at one time cultivated to some extent, it has been impossible for many years to secure the required quantity of wood in this country, and importations have been made from Belgium and Germany. The value of the wood at the present time will be appreciated from the fact that when carbonized, the charcoal is recognised as one of the most important of all charcoals used in the manufacture of explosives. its inflammable character making it peculiarly useful as an ingredient for smokeless powder.

Even before the commencement of the present war, manufacturers experienced a difficulty in securing the necessary amount of wood; therefore, there appears to be good reason for landowners in this country, and particularly in the home counties. laying down plantations to replace coppice, which at present hardly pays working expenses.

Under normal conditions *R. Frangula* is found as a bush 6 to 15 feet high with upright branches, or sometimes as a small tree 20 feet high, with a trunk 6 to 9 inches in diameter. The leaves are deciduous, bright green, oval, and 2 to 3 inches long by 1 to 1½ inches wide. The flowers are greenish-yellow and borne in May, and they are followed by small, round fruits, which are alternately red and black when ripening.

Tall; straight shoots with few side branches are most approved for charcoal, and such shoots may be from ½ an inch to 2 inches in diameter; larger wood can be used, but it is usually passed over in favour of the smaller sizes. The wood is either cut in spring when the sap is flowing freely, or in winter when at rest. In the former case the bark is peeled off at once as is done with spring-cut willows, but in the other instance the wood is boiled or steamed before peeling. Great care is taken to keep the newly-peeled wood free from dirt, and provision is made so that it does not come in contact with the ground, for any foreign matter has to be thoroughly cleaned away before the wood can be used. The wood is usually sold to the powder factories as soon as it is peeled, and in normal times the purchasers keep it for a period varying from one to three years before turning it into charcoal. To keep it clean during the process of seasoning it is often stacked and thatched, in the same way as hay or corn, as soon as it arrives at the factories. The exclusion of particles of sand and grit from the charcoal is of vital importance; therefore, after being thoroughly cleaned, the wood is placed in a closed cylinder for carbonization, heat being applied from outside. It is difficult to say what the wood is worth at the present moment, but a few years ago it was quoted at from £10 to £14 a ton.

The most suitable soil for *R. Frangula* is a moderately good loam, but as a rule it may be expected to thrive where the hazel grows well. Propagation should be conducted by means of seeds sown in boxes in a cold frame or in beds of well-drained soil out-of-doors. The young plants should be placed 6 inches apart in nursery rows 1 foot apart, and, when about 9 inches high, they

should be cut back to induce several branches to appear from near the ground line. When the young plants are from 12 to 18 inches high place them in permanent positions at intervals of from 4 to 5 feet, on ground that has been well broken up. From six to eight years rotation will probably be found most suitable for the crop, though position and soil may make a year or two difference either way. An open position exposed to south or west is considered to be most favourable. When cutting a plantation over, care should be taken to cut the branches as close as possible to the root stock; otherwise long, objectionable spurs will be formed. In the event of a large number of shoots being produced from cut-over plants, it is wise to remove all unnecessary ones during the first year. Growth is facilitated by keeping the ground free from coarse weeds and by working between the plants occasionally with a cultivator whilst they are small. Should signs of deterioration appear in the vigour of the branches, a dressing of bone or some other manure may be applied to the land, for a little money spent in this way will be amply repaid by increased yield.

It is doubtful whether a large stock of plants could be procured in the British Isles at the present time, and the catalogue price for single plants places the few which are available outside the bounds of practical forestry; it would therefore appear likely that anyone wishing to undertake the cultivation of this plant would need to commence by sowing seeds. The fruits may be collected during August or September and placed in sand to separate the seeds from the flesh, sowing the seeds and sand together during the early spring. People who already possess large or small plantations might find the present time an excellent one for marketing the produce.

In some parts of the country *R. Frangula* is known as dogwood, but it is quite distinct from the true dogwood, *Cornus*, which makes an inferior charcoal, and the two plants must not be confused.

XXX.—MISCELLANEOUS NOTES.

Mr. M. T. Dawe, F.L.S., formerly a member of the gardening staff of the Royal Botanic Gardens, and lately Director of Agriculture, Portuguese East Africa, has been appointed, on the recommendation of Kew, Agricultural Adviser to the Government of Colombia.

Mrs. Badderley.—We record with sincere regret the death of Mrs. Badderley, caretaker of the North Gallery, on June 26th, at the age of 67. Mrs. Badderley acted as caretaker of the Gallery from the day it was opened to the public in June, 1882, until the end of last March, when failing health compelled her retirement. During the period of nearly 33 years' faithful service she had won the affection of all with whom she had been associated in the Royal Botanic Gardens.

Robert Heath Lock.—The death of Dr. R. H. Lock, D.Sc., on June 26th, is a severe loss to botanical and agricultural science. After distinguishing himself in the Natural Sciences Tripos at Cambridge, Lock devoted himself to the study of plant breeding, and in September, 1902, was appointed scientific assistant to the Director of the Royal Botanic Gardens, Peradeniya, Ceylon, where he was able to carry out his researches under tropical conditions. During his two years in Ceylon he undertook experiments in plant breeding with *Pisum sativum* and *Phaseolus*, with important scientific results, and also initiated some of the experiments in Maize which he developed in later years. His paper on the growth of the giant Bamboo *Dendrocalamus giganteus* was the outcome of a series of observations made during the year 1903. On October 1st, 1904, Lock resigned his post in Ceylon, having been elected a Fellow of Gonville and Caius College, Cambridge, and continued his plant breeding work at the University, where also he held the post of Curator of the Herbarium. He returned, however, to Peradeniya in 1908 to take up his duties as Assistant Director of the Royal Botanic Gardens, and commenced his new work on January 28th of that year.

The experiment work of the Agricultural Department at the Peradeniya Experiment Station was under his particular charge, and he devoted himself more especially to plant breeding work in Maize, Paddy and Tobacco, achieving useful and important results. He also commenced work on Coffee with a view to producing a race resistent to the ravages of *Hemileia*. His resignation of the Assistant Directorship, on November 20th, 1912, unfortunately prevented the continuance of this and other valuable research work on which he was engaged. Shortly after his return to England, he received an appointment as Inspector under the Board of Agriculture and Fisheries, and was actively engaged on the duties of his post when a sudden heart attack caused his untimely death.

Kew and the War.—Since the publication of the last note in *K. B.* 1915, p. 96, seventeen more employees of the Royal Botanic Gardens have enlisted or re-enlisted. Nine members of the uniform section, including Corporal Constable J. Sealy and Laboratory Porter J. A. Mingay, have re-enlisted, the two latter to serve in the Army Ordnance Corps; three labourers, a carter and four young gardeners, including one of the sub-foremen, have enlisted. As two men have been discharged as unfit, the number of Kew employees serving with His Majesty's' Forces is now ninety-two. One young gardener has recently received a commission.

Botanical Magazine for May.—The plants figured are *Gentiana barbata*, Froelich, forma *grandiflora*, Freyn (t. 8609); *Zygopetalum Prainianum*, Rolfe (t. 8610); *Amelanchier florida*, Lindl. (t. 8611), and *Primula pycnoloba*, Bur. et *Franch.* (t. 8612).

The Gentian is a showy biennial which was raised from seed received from the Royal Botanic Garden, Edinburgh, in 1912, and flowered at Kew in September, 1914. It is a native of Siberia and differs from the typical form, which is figured at t. 639 of the Botanical Magazine under the erroneous name of *Gentiana ciliata*, in having a larger corolla and longer more acuminate sepals. Its leaves are linear-lanceolate, up to $2\frac{1}{4}$ in. long and over $\frac{1}{3}$ in. broad, and its solitary flowers have a bright blue corolla $2\frac{1}{2}$–3 in. long, with four spreading lobes $1\frac{1}{2}$ in. long and 1 in. broad; these lobes are fimbriate below the middle and entire in the upper part and at the base.

Zygopetalum Prainianum is a Peruvian species recently discovered by Mr. L. Forget and introduced by Messrs. F. Sander and Sons, of St. Albans, in whose collection it first flowered in September, 1914. The plant was then purchased for Kew. It is a close ally of *Z. Burkei*, Reichb. f., a native of Mount Roraima in British Guiana, but it has larger pseudobulbs and leaves, and its showy flowers differ in colour, having fewer green markings on the petals.

Amelanchier florida is an old inhabitant of our gardens, having been introduced from Western North America by David Douglas in 1826. It is found in British Columbia, Washington, Oregon and Nevada, and extends eastwards as far as Michigan. In botanical works as well as in gardens it has often been confused with *A. alnifolia*, Nutt., but it differs in being a caespitose shrub instead of a small tree, its leaves are toothed farther down the margin, its hypanthium is woolly or even quite glabrous, and it flowers about a fortnight earlier. The Kew plant which furnished the material for the figure was obtained in 1906 from a Continental nursery as *A. oxyodon*, Koehne, a name which must be regarded as a synonym of *A. florida*.

Primula pycnoloba is a very distinct though scarcely an ornamental species which was raised by Messrs. James Veitch & Sons from seeds sent from Szechuan, Western China, by Mr. E. H. Wilson. The drawing was made from a plant presented to Kew by Messrs. Veitch in 1912. Pax and Knuth include the species in the same section as that to which *P. sinensis*, Sabine, belongs. The plant has large broadly cordate or ovate-cordate leaves and a downy scape up a 8 ins. long bearing a rather dense terminal raceme of small dark pink flowers, with a large hairy acutely-lobed calyx. Propagation is easily effected by means of root-buds.

Botanical Magazine for June.—The plants figured are *Aristolochia longecaudata*, Mast. (t. 8613); *Hippeastrum Elwesii*, C. H. Wright (t. 8614); *Phelipaea foliata*, Lambert (t. 8615), and *Dorstenia yambuyaensis*, De Wild. (t. 8616).

The *Aristolochia* was originally described from material collected by Mr. C. F. Appun in British Guiana, and first flowered in cultivation in 1890, when the late Dr. Masters received a flowering specimen from Mr. Todd, of North Cray, Kent. The plant from which the material for the figure was obtained was presented to Kew in June, 1913, by the Rev. A. Miles-Moss, who

found it in the State of Pará, Brazil. It has grown well in a tropical house and flowered for the first time in February, 1914. The flowers, as is usual in the genus, have a disagreeable odour, and are characterised by the dense patch of hairs in the throat of the long-tailed perianth, which has a pale cream ground colour with brown streaks and reticulations on the outside.

Hippeastrum Elwesii has been introduced into cultivation by Mr. H. J. Elwes, who found it himself near Lake Nahuel-Huapi, on the Rio Limay, in Argentina, in 1902. A plant brought to England by Mr. Elwes first flowered in his garden at Colesborne in September, 1903. It flowered again last year, when the plate, which was partly prepared from material supplied in 1903, was completed. The species is allied to *H. Ananuca*, Phil., from which it may be easily distinguished by its uniformly pale yellow perianth-lobes and the tube claret-coloured inside, while in *H. Ananuca* the lobes are yellow with vivid red midribs.

Phelipaea foliata is a handsome parasitic herb belonging to the *Orobanchaceae*, a native of the Crimea and Caucasus, its host always being *Centaurea dealbata*, Willd. It has numerous synonyms including *Orobanche coccinea*, M. Bieb. and *Anoplanthus coccineus*, Walp. The plant has been in cultivation for many years, at least as long ago as 1879, when its large bright scarlet flowers, which make a striking contrast to the silvery grey foliage of the host, were produced in the Imperial Botanic Garden, Petrograd. Seeds of the plants from which the material for the figure was obtained were received in 1911 from the Botanic Garden, Tiflis. and together with some of those of the *Centaurea* were sown in a pot. The seedlings of the host plant germinated in 1911, and were planted out in the Rock Garden later in the same year and grew alone till May, 1914, when the *Phelipaea* made its appearance.

The *Dorstenia* is a plant mainly of botanical interest and a native of the Belgian Congo, in some districts of which it is plentiful. It first appeared in Europe at the Colonial Garden, Laeken, near Brussels, and reached England in 1910, when a plant was exhibited at a meeting of the Royal Horticultural Society by Messrs. J. Veitch & Sons on behalf of the Director of the State Botanic Garden, Brussels. The plant was afterwards presented to Kew and was used in preparing the figure.

Marshall's Arbustum Americanum.—A copy of this rare work was presented to Kew in 1902 by the New York Botanical Garden. The title is "Arbustum Americanum: The American Grove, or an Alphabetical Catalogue of Forest Trees and Shrubs, natives of the American United States." The book was published at Philadelphia in 1775, and the Kew copy bears the number 2986. It is believed to be "the first truly indigenous botanical essay published in the Western Hemisphere,"* and forms a small octavo volume of nearly 200 pages. It was well received in Europe, and was translated into French and German in 1778. It contains

* Darlington, W. Memorials of John Bartram and Humphry Marshall. p. 489 (1849).

numerous new species, some of which have been omitted from the "Index Kewensis." The compilers of the Index do not appear to have seen the work, but to have taken up many of the new species at second-hand. The following are the species omitted from the "Index Kewensis." The six names preceded by a † have been adopted in Britton, Manual of the Flora of the Northern States and Canada, ed. 3 (1907), and in Britton and Brown, Illustrated Flora, ed. 2 (1913). *Corylus cornuta*, Marsh., is an earlier name for *C. rostrata*, Ait.; and *C. americana*, Marsh., replaces *C. americana*, Walt., which it antedates by three years. The remaining nine names appear to be synonyms.

†*Aesculus octandra*, Marsh. Arbust. 4 (1785); a prior name for *A. flava*, Ait.

†*Acer saccharum*, Marsh, l.c.; a prior name for *A. saccharinum*, Wangenh.

Andromeda plumata, Bartr. ex Marsh. l.c. 9; apparently a form of *Pieris nitida*, Benth. & Hook. f.

Aristolochia frutescens, Marsh. l.c. 12; a synonym of *A. macrophylla*, Lam.

†*Betula papyrifera*, Marsh. l.c. 19; a prior name for *B. papyracea*, Ait.

†*Betula populifolia*, Marsh. l.c.; a prior name for *B. populifolia*, Ait.

Betula humilis, Marsh. l.c.; possibly identical with *B. papyrifera*, var. *minor*, Tuckerm.

Corylus americana, *Marsh.* l.c. 37; a prior name for *C. americana*, Walt.

Corylus cornuta, *Marsh.* l.c.; a prior name for *C. rostrata*, Ait. Marshall evidently sent seeds or plants of the species to Europe, where it became known in gardens under the name "*C. cornuta*, Hort."—see advertisement on p. 170.

Hydrangea frutescens, Marsh. l.c. 61; a synonym of *H. arborescens*, Linn.

Juglans pecan, Marsh. l.c. 69; a synonym of *Hicoria pecan*, Britton.

Laurus geniculata, Marsh. l.c. 74; practically a nomen nudum: probably identical with *L. geniculata*, Walt., and therefore a synonym of *Glabraria geniculata*, Britton.

Ledum thymifolium, Marsh. l.c. 75; a synonym of *Dendrium buxifolium*, Desv.

†*Lonicera canadensis*, Bartr. ex Marsh. l.c. 81.

Mespilus apiifolia, Marsh. l.c. 89; a synonym of *Crataegus Marshallii*, Eggl. (*C. apiifolia*, *Mich.*).

Staphylea trifoliata, Marsh. l.c. 148; a variant of *S. trifolia*, Linn.

†*Taxus canadensis*, Marsh l.c. 150.

T. A. S. AND M. L. G.

Triumfetta japonica.—Under this name Mr. T. Makino has recently described* a species from Japan and Corea which previous authors had identified with *T. trichoclada*, D.C., and *T.*

* Bot. Mag. Tokyo, 1913, vol. xxvii. p. 245.

annua, Linn. He states that it differs from *T. annua* in having hairy spines on the capsule, the leaves hairy on both surfaces, and the stipules and peduncles hairy; and from *T. trichoclada* in not having 7-nerved leaves and 4-sepalous calyx.

T. trichoclada, D.C. (*T. triclada*, Link) is, however, inseparable from *T. annua*, Linn.* The flowers of *Triumfetta* are usually pentamerous as regards the calax and corolla, but occasional tetramerous and hexamerous flowers have been observed along with pentamerous ones on the same specimen.† With regard to the characters in which *T. japonica* is stated to differ from *T. annua*, it should be noted that the latter also has hairy stipules and peduncles, and leaves bearing hairs on both surfaces. The remaining diagnostic character, the presence of hairs on the prickles of the capsule, is by itself hardly of specific value.

Judging from the description, *T. japonica* appears to be identical with *T. annua*, forma *piligera*, Sprague & Hutchinson, which differs from typical *T. annua* in having hairy prickles and fruit-body. This was recorded by the authors from Natal and Madagascar,‡ and has since been noted from Corea (*Faurie* 889 in Herb. Zürich) and the Philippine Islands (*Merrill* 4285). It was assigned the rank of a form rather than that of a variety chiefly on account of its sporadic distribution. Its synonymy and distribution are as follows:—

Triumfetta annua, forma **piligera,** *Sprague & Hutchinson* in Journ. Linn. Soc., Bot. vol. xxxix. p. 268 (1909).—*T. japonica*, Makino in Bot. Mag. Tokyo, 1913, vol. xxvii. p. 245.

Distrib. Natal, Madagascar, Philippine Islands, Corea, Japan.

T. A. S.

Fomes juniperinus.—In the note on *Fomes juniperinus* published in *K.B.*, 1915, by an unfortunate oversight it is stated on p. 104 that Lloyd had recorded this species from Russia. The plant recorded by Lloyd is *Daedalea juniperina* (Murr.) P. Syd. Therefore the type of *F. Demidoffii*, which is probably the same as *F. juniperinus*, remains at present the only record from this region.

E. M. W.

Flora Capensis.—The first part of vol. v. section 2 of this work has now appeared.

The families dealt with are the *Thymelacaceae*, 181 species arranged in 12 genera, by Mr. C. H. Wright, the *Penaeaceae*, 24 species in 5 genera, and the *Geissolomaceae*, 1 monotypic genus, by Miss E. L. Stephens of Cape Town, the *Loranthaceae*, 42 species in 2 genera, by Mr. T. A. Sprague, and up to the 112th species of the genus *Thesium* in *Santalaceae*, by Mr. A. W. Hill, this last family being represented by 6 genera.

The Botanic Gardens, Dominica.—We welcome the Official Guide to the Botanic Gardens, Dominica, which has just been

---

* Journ. Linn. Soc., Bot., vol. xxxix. p. 268 (1909).
† l.c. 235.
‡ l.c. 269.

published. The Guide consists of some 44 pages, with map, illustrations and a useful index, and is full of interesting information about the numerous plants cultivated in the Gardens.

The area occupied by the Gardens and experiment grounds is now some 60 acres, 44 of which constitute the Garden proper. The present site was purchased in 1891, and the work of laying out the ground was commenced by Mr. H. F. Green, then curator, now in India. Since March, 1892, when Mr. Joseph Jones was appointed to the Curatorship from Kew, the Gardens have been continuously under his charge, and it is due to his skill and devotion that Dominica now possesses, for its size, one of the finest tropical botanic gardens in the world.

The Dominica Garden owes much to the beauty of its situation, but the remarkable interest of its collections, so well displayed in the Guide, is due to its Curator, with whose name it must always be associated.

In addition to the account of the Garden proper, the experiment grounds and nurseries, which form so important a feature of the work under the Curator's charge, are also shortly described. Here the limes, which may be said to have revolutionised the planting industry in Dominica, are being constantly raised and grafted and sent out to planters, as well as grafted cacao and mango, Pará rubber, vanilla, coffee, nutmegs, and other plants and trees of economic importance.

The Guide is a very readable work, and Mr. Jones is to be warmly congratulated on its production, more especially when it is remembered that it represents the results of the twenty-three years' loving service he has given, not to Dominica merely, but rather to the Empire in general.

Flora of the Kaikoura Mountains, New Zealand.—In a letter to the Director, Royal Botanic Gardens, Kew, dated Wellington, New Zealand, 29th April, 1915, Mr. B. C. Aston writes:—"I have recently begun the botanical exploration of a part of the Kaikoura Mountains (which go up to 9500 ft.) with gratifying results. The deep canyons of the limestone country have yielded (1) a new *Gentiana*, (2) the finest *Wahlenbergia* yet found in New Zealand, perennial and forming large masses of growth on the cliff faces, (3) a new *Carmichaelia*, and (4) some less interesting species; while the discovery of Kirk's *Olearia coriacea* in flower places that species in the section with *Olearia Forsteri*, the only other member of the genus having a single floret in each head, and supplies some additional evidence for the restoration of Forster's genus *Shawia*."

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 7] [1915

XXXI.—NEW TROPICAL AFRICAN SPECIES OF FICUS.

J. Hutchinson.

The first account of the African species of *Ficus* was published by Miquel in 1849 in a paper entitled "Over de afrikaansche Vijge-Boomen." Therein are described, under what are now subgeneric names, 38 species from Tropical and 5 from South Africa, together with a few others from the Mascarene Islands, North East Africa, and the Orient.

For many years thereafter, the genus *Ficus* was left severely alone. The concluding part of De Candolle's Prodromus, published in 1873, contains only a conspectus by Bureau and a brief account of the literature of the *Artocarpaceae*. In 1887–9 King remedied this defect as regards South-eastern Asia, but did not deal with Africa.

A large number of African species have been described by Warburg during the last few years, chiefly in Engler's Jahrbücher and in the publications of the Herbarium of the Brussels Botanic Garden. But the laborious task of a revision of the African species was at length undertaken by Dr. J. Mildbraed, of the Berlin Herbarium staff and botanical collector to the expeditions of the Duke of Mecklenburg through Central Africa. As Mildbraed was unable to finish his account owing to his departure on a second collecting trip, the work was completed by Dr. M. Burret, and was published in Engler's Jahrbuch for 1911. This revision contained descriptions of several new species, and altogether there were 94 species enumerated as occurring in Tropical Africa. The extensive materiál collected by Mildbraed on his first journey was included in this account.

In working up the genus for the Flora of Tropical Africa, the abundant material gathered by Mildbraed on his second expedition was freely placed at my disposal, and he rendered me valuable assistance in its determination. His name, therefore, stands in the present paper as joint author of such of those species as are founded on his specimens.

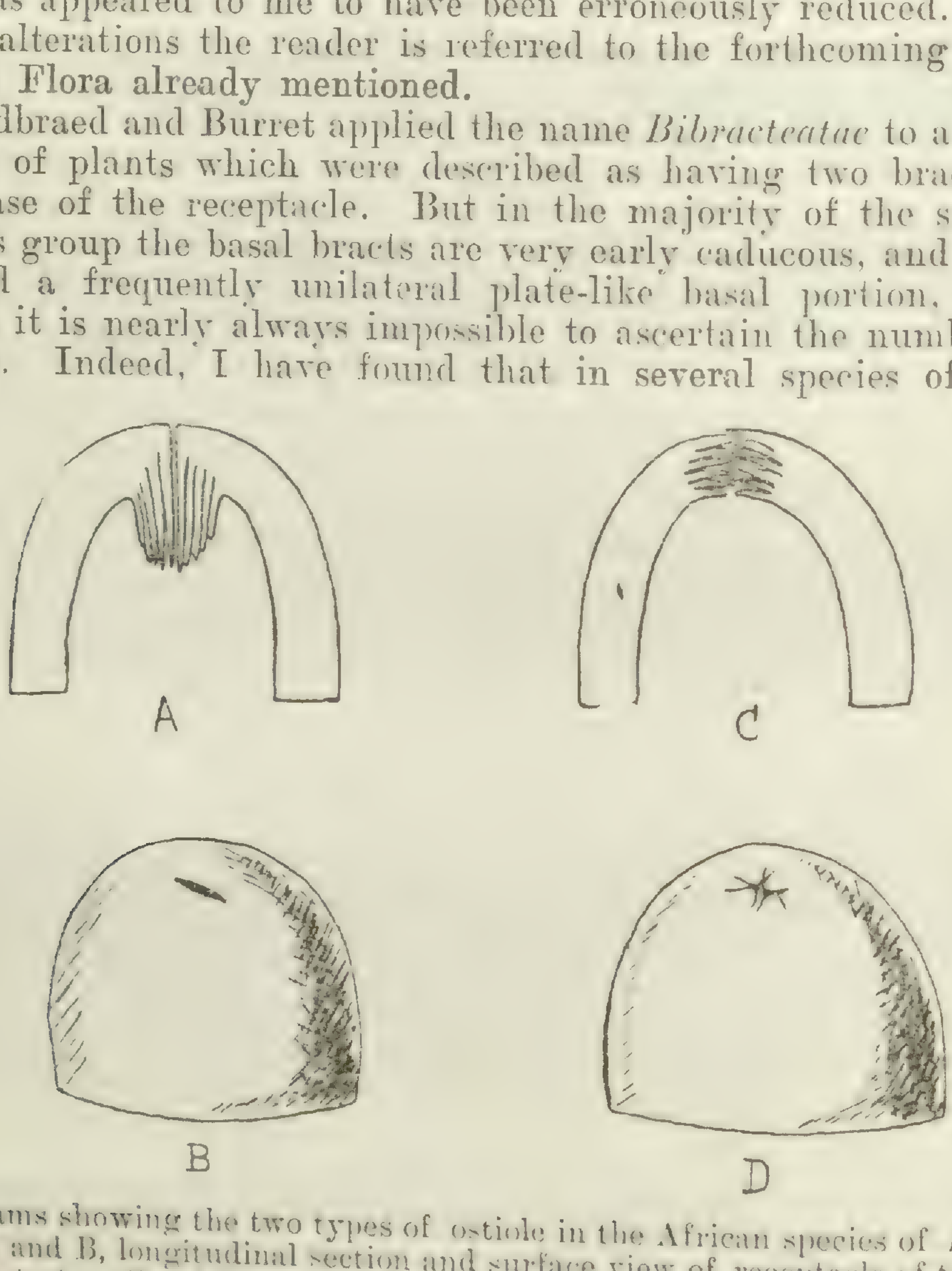
In addition to the above, there had been extensive collecting of the genus in the Belgian Congo, where in number of species it is most richly represented in Tropical Africa. Many of these

(3993.) Wt. 153–601. 1,125. 8/15. J.T. & S. G. 14.

proved to be new species, and were described by De Wildeman in Fedde's Repertorium for 1913. The same author published a complete list of the species of *Ficus* collected in the Belgian Congo, together with descriptions of a few new ones, in the Bull. Soc. Bot. Belg. vol. li.

At the present date there are 173 species of *Ficus* known from Tropical Africa, almost all of them being endemic. A key to these, with full descriptions of each species, will appear in the forthcoming parts of the Flora of Tropical Africa. The following notes are intended to show the general treatment of the species in that work as compared with the German revision. In the latter the species were arranged under 5 subgenera, as follows:—i. Carica, Miq., one species; ii. Sycomorus, Gasp., 7 species; iii. Sycidium, Miq., 6 species; iv. Urostigma, Gasp., 6 species, and the remaining 73 species, under a new subgenus termed the Bibracteatae, the members of which were included in *Urostigma* by Miquel. The present paper deals chiefly with the last subgenus, as Mildbraed and Burret's arrangement of the other four subgenera has been mainly followed, with the addition of a few new species (here described) and the revival of such as appeared to me to have been erroneously reduced. For these alterations the reader is referred to the forthcoming parts of the Flora already mentioned.

Mildbraed and Burret applied the name *Bibracteatae* to a large group of plants which were described as having two bracts at the base of the receptacle. But in the majority of the species of this group the basal bracts are very early caducous, and leave behind a frequently unilateral plate-like basal portion, from which it is nearly always impossible to ascertain the number of bracts. Indeed, I have found that in several species of this



Diagrams showing the two types of ostiole in the African species of *Ficus*—A and B, longitudinal section and surface view of receptacle of the *Bibracteatae*; C and D, the same of the other subgenera represented in Africa.

group there are three bracts in the young, or traces of three in the mature receptacles. A much better distinguishing feature for the whole of this subgenus is to be found in the arrangement of the bracts of the ostiole of the receptacle. In the other subgenera these bracts spread horizontally across the mouth of the ostiole, and several are visible from the outside (see diagram figs. C and D). In the *Bibracteatae*, however, the ostiole has quite a different appearance. From the outside it appears as a pore-like slit, much resembling the stoma of a leaf, with none of the bracts visible externally, but all of them abruptly reflexed and descending vertically into the receptacle (diagram figs. A and B).

The other subgenera are distinguished from one another chiefly by the number of stamens in the male flowers. This, though apparently a trifling character in itself, gives a very natural grouping of the species. The subgenus *Sycidium* is, however, further characterised, and differs from the other three in having the bracts, which are usually in a whorl at the base of the receptacle, scattered indiscriminately on the peduncle and frequently over the outer surface of the receptacle (fig. E).

E

The following is a key to the subgenera :—

Receptaculi ostiolum conspicue bracteatum, bracteis per orificem transverse radiantibus :—	
Bracteae basales receptaculi verticillatae, solum ad apicem pedunculi dispositae :—	
Flores masculi staminibus 3–6 ; folia dentata vel lobata, scabrida	I. Carica.
Flores masculi plerumque staminibus 2; folia saepe dentata, scabrida vel hirsuta	II. Sycomorus.
Flores masculi stamine unico; folia semper integra et fere semper laevia, rarius pubescentia vel subscabrida	IV. Urostigma.
Bracteae basales in pedunculis et receptaculis spiraliter dispositae, interdum minimae...	III. Sycidium.
Receptaculi ostiolum poriforme, plus minusve bilabiatum, bracteis omnibus in receptaculi interiora abrupte reflexis ab extra non visis	V. Bibracteatae.

Mildbraed and Burret divided the *Bibracteatae* into seven sections as follows, their characters being more or less indicated by their names :—i. *Platyphyllae;* ii. *Caulocarpae;* iii. *Fasciculatae;* iv. *Elegantes;* v. *Crassicostae;* vi. *Cyathistipulae;* vii. *Chlamydodorae.* On account of the addition of a great number of new species to this group, many of the differences which served to separate these sections have disappeared. In the

Flora of Tropical Africa the species have, therefore, been re-arranged into series and subseries as follows:—

Series I. Fasciculatae. Receptacula in ramis efoliatis brevissimis fasciculatim disposita vel in trunco vel ramis primariis fasciculata; stipulae plerumque caducae.

Series II. Axillares. Receptacula axillaria, solitaria vel geminata; stipulae persistentes vel caducae.

Subseries i. *Stipulares*. Stipulae persistentes, plerumque magnae et conspicuae.

Subseries ii. *Caducae*. Stipulae caducae, plerumque parvae et inconspicuae.

The *Fasciculatae* form a very natural group of 28 species in which the receptacles are arranged in fascicles either on the main trunk or on the primary branches. So far as I am aware they never occur in these positions and also in the leaf-axils. The *Fasciculatae* embrace the sections *Caulocarpae*, *Fasciculatae* and *Elegantes* of Mildbraed and Burret.

The *Axillares* represent the remainder of the *Bibracteatae* in which the receptacles are borne either singly or in pairs in the leaf-axils of the young shoots. They are readily divided into two groups; the first the *Stipulares* (= section *Cyathistipulae*, Mildbr. & Burret) containing 23 very closely allied species distinguished by the persistent stipules, which are almost invariably large and conspicuous. Associated with this striking feature is a usually thick and more or less straw-coloured nervation of the leaves.

The second group, the *Caducae* (= sections *Platyphyllae*, *Crassicostae* and *Chlamydodorae*, Mildbr. & Burret), contains a large number of species, in all of which the stipules fall off immediately on the unfolding of the young leaves. It may be further separated into several smaller groups mostly on leaf-characters, to which I have not assigned special names. About seven species form a small group with *F. Lepricurii*, Miq. (= *F. triangularis*, Warb., of gardens) as a typical example, in which the leaves are obtriangular in shape, with the midrib frequently bifurcate towards the apex. Several species, such as *F. eriobotryoides*, Kth. & Bouché, are distinguished by their large basal bracts, which for a considerable time more or less completely invest the receptacles. About half the remainder of the *Caducae* have sessile receptacles, whilst further useful characters for classification are derived from the shape of the leaves, their nervation, venation and hairy covering, and the shape, size, and indumentum of the receptacles. In contrast with King's grouping of the Indian species, the African ones afford few determinative factors in the male and female flowers.

I am much indebted to Miss M. Smith for the sketches which accompany the following new species.

Subgenus Sycomorus, *Gasp.*

F. golungensis, *Hutchinson;* species subgeneris *Sycomori* imperfecte cognita, foliis basi 1–7 dentatis infra laxe reticulatis distincta.

Arbor 4–8 m. alta vel ultra, interdum parasitica, laticem viscidum exudens; truncus rectus, erectus, inferne nudus,

primum hirsutus; rami elongati, ascendentes, hirsuti, foliosi. *Folia* obovata vel elliptico-obovata, apice rotundata vel paulum acuminata, basi cordata, 18–28 cm. longa, 11–18 cm. lata, basi 1–7 dentata, dentibus magnis obtusis, ceterum integra, submembranacea, supra parce pilosa, infra pilis patulis albis longe pilosa, basi 7-nervia; nervi laterales utrinsecus 8–9, a costa sub angulo 45° abeuntes, intra marginem 1–4 cm. furcati, utrinque distincti, infra prominentes; nervi tertiarii laxe flexuosi, infra prominentes; petioli 2·5–12 cm. longi, robusti, hirsuti; stipulae ovato-lanceolatae, acuminatissimae, 1·3–3 cm. longae, purpurascentes, deciduae. *Receptacula* ignota. *F. sp.*, Hiern in Cat. Afr. Pl. Welw. 1016.

Angola: Golungo Alto; forests of Queta Mts., parasitical on *Pseudospondias microcarpa*, Engl., *Welwitsch* 6409; Cuango river, *Welwitsch* 6347.

Subgenus Sycidium, *Miq.*

F. acutifolia, *Hutchinson;* affinis *F. capreaefoliae*, Del., sed foliis alternis apice integris acuminatis nervis lateralibus patulis differt.

Ramuli graciles, foliosi, sicco purpurascentes, primum parce hispidi. *Folia* lineari-lanceolata, sensim et obtuse acuminata, basi rotundata vel obtusa, 9–12 cm. longa, 2–3 cm. lata, integra, tenuiter chartacea, utrinque paulum scabrida; costa media utrinque prominens, supra angusta, infra latior, basi circiter 1 mm. lata, ad laminae apicem sensim angustata; nervi laterales utrinsecus 9–10, a costa sub angulo 75°–90° abeuntes, utrinque distincti, infra prominentes, marginem versus subrecti; nervi tertiarii laxe reticulati, infra prominentes; veni infra inconspicui; petioli breves, 4–6 mm. longi, paulum setuloso-pubescentes; stipulae caducae, lineari-lanceolatae, subacutae, 2·5 mm. longae, coriaceae, glabrae vel fere glabrae. *Receptacula* axillaria, solitaria, pedunculata, subglobosa, circiter 1·3 cm. diametro, breviter setulosa; pedunculi graciles, circiter 8 mm. longi, setulosi, bracteis 2–3 parvis sparsis muniti. *Ostiolum* subprominens, conspicue bracteatum, bracteis trans orem horizontaliter patulis. *Flores* ♂ longe pedicellati, pedicellis glabris; perianthii segmenta lanceolata, subacuta, membranacea, glabra; stamen solitarium; anthera obtusa. *Flores* ♀ breviter pedicellati; achaenia laevia, stylo gracile. *Flores insectiferi* pedicellati.

Cameroons: Bipinde, *Zenker* 1709.

Chevalier's No. 12228 from Kollangui, French Guinea, seems to be this species; there are no receptacles on the Kew specimen.

Subgenus Urostigma, *Gasp.*

F. katagumica, *Hutchinson;* a *F. ingentei*, Miq., receptaculis molliter et dense tomentosis recedit.

Arbor umbrosa; ramuli foliosi, molliter tomentosi, sulcati. *Folia* ovato-oblonga vel oblongo-elliptica, basi leviter cordata vel rotundata, apice rotundata, 6–10 cm. longa, 3–6·5 cm. lata, integra, rigide subcoriacea, utrinque glabra et subglauca; costa media utrinque prominens, infra basi circiter 2 mm. lata, ad laminae apicem sensim angustata sed furcati; nervi laterales

utrinsecus 5–6, a costa sub angulo 60° abeuntes, intra marginem prominenter bifurcati, utrinque distincti, graciles, straminei; veni supra quam infra prominentiores, reticulationem intricatum formantes; petioli 2–2·5 cm. longi, basin versus tomentosi, stramminei, stipulae caducae, coriaceae, tomentosae. *Receptacula* axillaria, solitaria vel geminata, pedunculata, globosa vel leviter obovoideo-globosa, 1 cm. diametro, dense albo-tomentosa; pedunculi 4–6 mm. longi, 1·5 mm. crassi, dense et molliter tomentosi. *Bracteae* basales 3, plus minusve ovatae, obtusae, subpersistentes, basin versus pubescentes. *Ostiolum* leviter prominens, extra bracteatum, bracteis glabrescentibus. *Flores* ♂ subsessiles,

Ficus katagumica, *Hutchinson*; nat. size; separate receptacle × 2½.

perianthii segmentis acutis; stamen unicum, filamento breve; anthera lata. *Flores* ♀ perianthio ut in floribus ♂. *Flores insectiferi* pedicellati.

Northern Nigeria: Katagum district, *Dalziel* 305.

F. kawuri, *Hutchinson;* affinis *F. ingentei,* Miq., receptaculis dense albo-tomentosis differt.

Arbor magna; ramuli foliosi, molliter dense tomentosi. *Folia* oblonga vel oblongo-lanceolata, basi plerumque truncata, vel interdum leviter cordata, apice obtuse et breviter acuminata, 7–18 cm. longa, 3–7·5 cm. lata, integra, tenuiter chartacea, utrinque costa media supra excepta glabra et opaca; costa supra in parte inferiore pubescens, infra prominens, basi circiter 2·5 mm. lata, ad laminae apicem sensim angustata; nervi laterales utrinsecus 8–10, a costa sub angulo 45°—60° abeuntes, utrinque prominentes sed subgraciles, intra marginem conspicue bifurcati; veni utrinque prominentes, conspicue reticulati; petioli 2·5 cm. longi, sulcati, molliter pubescentes; stipulae caducae, extra tomentosae. *Receptacula* in axillis defoliatis disposita, solitaria vel geminata, pedunculata, subglobosa, circiter 1 cm. diametro, molliter et dense albo-tomentosa; pedunculi 5 mm. longi, teretes, tomentosi. *Bracteae basales* subpersistentes, extra rubro-pubescentes. *Ostiolum* extra bracteatum; bracteae interiores patulae. *Flores* ♂ circum ostiolum conferti, sessiles; perianthii segmenta membranacea, glabra; anthera solitaria, subsessilis. *Flores* ♀ breviter pedicellati; achaenia obovoidea, laevia; stylus lateralis, stigmate sublacerato. *Flores* insectiferi pedicellati.

Northern Nigeria: Lokoja, and common in all Northern Nigeria, *Dalziel* 910. Cameroons: between Kanjang and Boki, *Ledermann* 3691.

F. ingentoides, *Hutchinson;* a *F. kawuri,* Hutchinson, receptaculis subsessilibus recedit.

Ramuli juniores molliter tomentosi, foliosi. *Folia* oblongo-lanceolata, vel ovato-oblonga, basi rotundata vel leviter cordata, apice breviter et obtuse acuminata, 6–13 cm. longa, 2·5–6 cm. lata, integra, tenuiter coriacea, utrinque opaca et glabra vel supra nitidula; costa media utrinque distincta, ad laminae apicem sensim angustata; nervi laterales utrinsecus 8–10, a costa sub angulo 80° abeuntes, utrinque distincti, intra marginem bifurcati; veni utrinque reticulationem gracilem formantes; petioli 2–3 cm. longi, pubescentes, demum glabri vel fere glabri; stipulae caducae, coriaceae, extra pubescentes. *Receptacula* in axillis defoliatis disposita, breviter pedunculata, globosa vel leviter obovoideo-globosa, circiter 1 cm. diametro, molliter tomentosa; pedunculi 2 mm. longi vel subnulli, robusti, tomentosi. *Bracteae basales* persistentes, extra leviter pubescentes, intra glabrae. *Ostiolum* extra parce bracteatum, bracteis puberulis. *Flores* ♂ subsessiles; perianthii segmenta membranacea; stamen solitarium; anthera longior quam lata. *Flores* ♀ sessiles; achaenia laevia; stylus gracilis, stigmate acuto. *Flores insectiferi* pedicellati. *F. Stuhlmannii,* var. *glabrifolia,* Warb. in Engl. Bot. Jahrb. xx. 162. *F. lutea,* Mildbr. et Burret in Engl. l.c. xlvi. 209, partim, non Vahl.

Eritrea: neighbourhood of Acrur, *Schweinfurth* 1687. German East Africa: Usukuma; Njangesi, *Stuhlmann* 4144; Victoria Nyanza; Bussisi, *Stuhlmann* 750; Muansa, *Stuhlmann* 4585.

Subgenus Bibracteatae, *Mildbr. & Burret.*

F. Buntingii, *Hutchinson;* affinis *F. ugandensi*, Hutchinson, nervis lateralibus numerosioribus ad folii basin dense dispositis differt.

Epiphytica; caulis usque ad 1 m. circumdato; ramuli juniores elongati, ad apicem attenuati, costati, glabri. *Folia* elongato-oblonga, sensim et obtuse acuminata, basi rotundata vel obtusa, 10–16 cm. longa, 2·5–4 cm. lata, integra, supra nitida, infra opaca et glabra; costa media supra plana, infra prominens, ad laminae apicem sensim attenuata; nervi laterales utrinsecus circiter 10, a costa sub angulo 75° abeuntes, arcuati, prope marginem conjuncti, infra prominentes; nervi tertiarii reticulati, venis infra arcte reticulatis; petioli circiter 1·2 cm. longi, glabri, supra sulcati; stipulae mox caducae, parvae, acutae. *Receptacula* fasciculata, in ramulis brevissimis efoliatis ex trunco ortis disposita, pedunculata, subglobosa, maturate circiter 4·5 cm., sicco circiter 3 cm. diametro, parietibus percrassis, basi cordata, strigilloso-pubescentia; pedunculi 3 cm. longi, recurvati, robusti, puberuli. *Bracteae basales* caducae, ex icone plus minusve lanceolatae et circiter 1·5 cm. longae, probabiliter membranaceae. *Ostiolum*

Ficus Buntingii, *Hutchinson*; nat. size; base of leaf × 2.

parvum et poriforme, bracteis omnibus in receptacula descendentibus. *Flores* ♂ satis longe pedicellati, anthera solitaria obtusa. *Flores* ♀ pedicellati; stigmata papillosa.

Liberia: Mano River bank in the Gola Forest, *Bunting in Herb. Mus. Brit.*

According to the collector the latex and fruits of this species are worthless.

F. ugandensis, *Hutchinson;* affinis *F. Gossweileri*, Hutchinson, foliis laxe reticulatis basi late rotundatis, receptaculis basi rotundatis differt.

Arbor 10 m. alta vel ultra; ramuli cortice cinereo glabro obtecti. *Folia* elliptica vel oblongo-elliptica, basi rotundata, breviter acuminata, 5-11·5 cm. longa, 2·5–5·5 cm. lata, integra, chartacea, supra pustulata, infra glabra et leviter nitida; costa media supra plana, infra prominens, basi 1 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 9 11, a costa sub angulis 45°–60° abeuntes, subopposite, utrinque prominentes, marginem versus conjuncti et ramosi; nervi tertiarii venique infra laxe reticulati; petioli 2–3 cm. longi, valide sulcati, glabri; stipulae caducae. Receptacula in ramis principibus fasciculata, pedunculata, ellipsoideo-globosa, circiter 3 cm. longa, puberula; pedunculi 2 cm. longi, circiter 2·5 mm. crassi, minute puberuli. *Bracteae basales* mox deciduae, non visae. *Ostiolum* bilabiatum, subinconspicuum, bracteis omnibus in receptacula descendentibus. Flores ♂ breviter pedicellati; perianthii segmenta 4–5, lineari-lanceolata, subacuta, membranacea, glabra; stamen solitarium, filamento breve; anthera ovoidea, obtusa. *Flores insectiferi* longe pedicellati.

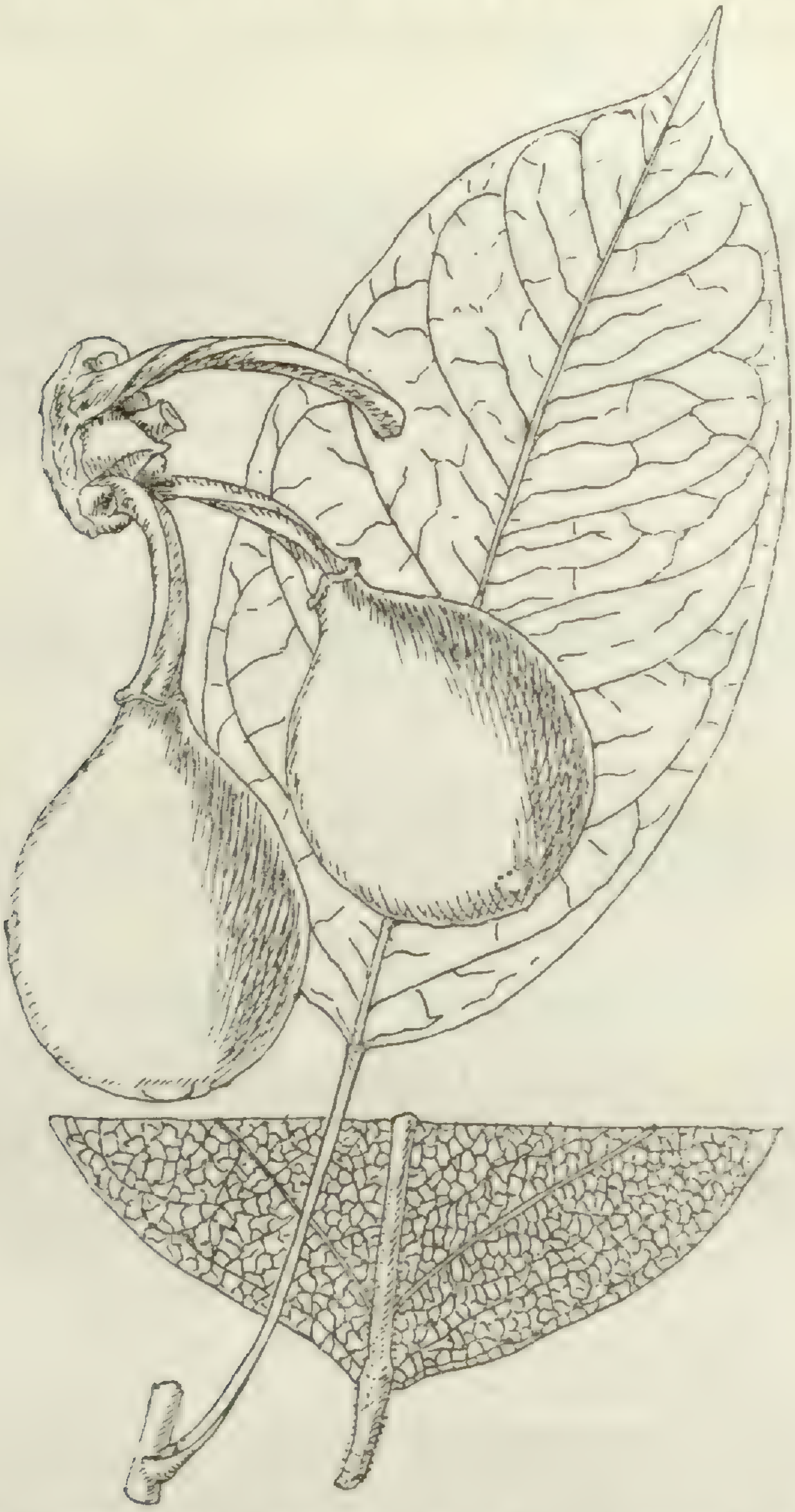
Uganda: Buddu, 1200 m., *Dawe* 256.

F. Gossweileri, *Hutchinson;* affinis *F. ugandensi*, Hutchinson, quam vidi.

Arbor 16 m. alta, trunco irregulare et corona lata; rami patuli, supra ramulis efoliatis fructiferis 5–10 cm. longis ornati; ramuli juniores breves, glabri vel interdum tenuiter puberuli. *Folia* oblonga vel oblongo-elliptica, subabrupte acuminata, acumine 1·5-8 mm. longo, obtusa, basi truncata vel leviter rotundata, 5–10 cm. longa, 2·5–5 cm. lata, integra, chartacea, sicco utrinque opaca, infra arete et tenuiter reticulata; costa media supra leviter impressa, infra prominens. basi 1 1·5 mm. crassa, ad laminae apicem attenuata et pergracilis; nervi laterales utrinsecus 9-10, a costa media sub angulo 60° abeuntes, pergraciles, prope marginem conjuncti, utrinque distincti; nervi tertiarii laxi et inconspicui; petioli 2·5–7·5 cm. longi, graciles, minute puberuli; stipulae caducae, lanceolatae, longe acuminatae, circiter 1·2 cm. longae, subcoriaceae, glabrae. *Receptacula* fasciculata, in ramulis brevissimis ex ramis principibus ortis disposita, pedunculata, obovoidea, basi contracta, 3·5 cm. longa, 2–2·5 cm. diametro, arete maculata, molliter pubescentia; pedunculi 2–2·5 cm. longi, circiter 1·5 mm. crassi, sicco angulares et contorti, molliter pubescentes. *Bracteae basales* mox deciduae. *Ostiolum* leviter elevatum, subtomentosum, bilabiatum; bracteae omnes in receptacula descendentes, duae prope orificem lineares, obtusae, 6 mm. longae, subcarnosae, glabrae, ceteris acute acuminatis. *Flores* ♂

breviter pedicellati; perianthii segmenta obovato-oblanceolata, apice rotundata, glabra; stamen solitarium, ad filamenti basin stylo gracile evoluto; filamentum 1 mm. longum; antherarum loculi basi divergentes, apice connectivo leviter producto. *Flores* ♀ perianthii segmentis acute acuminatis; stylus gracilis, stigmatibus florum numerosorum coherentibus.

Angola: Malange district; M'Bango woods, *Gossweiler* 1005.



Ficus Gossweileri, *Hutchinson*; nat. size; base of leaf × 2.

F. rudens, *Hutchinson;* species affinis *F. tremulae,* Warb., Africae orientalis incolae, sed foliis ambitu, receptaculis majoribus, pedunculis robustioribus differt.

Scandens; caules molles, rudentiformes (*Gossweiler*), usque ad 18 m. alti; ramuli graciles, glabri. *Folia* oblongo-elliptica vel leviter obovato-elliptica, acute acuminata, acumine 6–10 mm. longo, basi cordata, 3·5–7·5 cm. longa, 2–3·5 cm. lata, integra, submembranacea, utrinque glabra et opaca; costa media supra leviter impressa, gracilis, infra satis prominens, basi circiter

0·5 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 6–7, a costa sub angulo 90° abeuntes, prope marginem conjuncti, graciles, infra distincti; veni infra laxi et distincti; petioli 0·8–2 cm. longi, pergraciles, glabri; stipulae deciduae, non visae. *Receptacula* in trunco gesta, in ramis efoliatis brevissimis fasciculata, circiter 6-nata, pedunculata, ellipsoidea vel obovoideo-ellipsoidea, basi leviter contracta, 2 cm. longa, 1·3 cm. diametro, tenuiter verrucosa, minutissime puberula; pedunculi robusti, 1·3 cm. longi, compressi, 2 mm. crassi, minute puberuli. *Bracteae basales* mox caducae. *Ostiolum* minimum, bilabiatum, non productum; bracteae omnes in receptacula descendentes, plus minusve subulato-lanceolatae, acutae, glabrae. *Flores* ♂ pedicellati; perianthii segmenta 3, elliptica, subacuta; stamen solitarium; filamentum satis robustum; anthera ovoideo-ellipsoidea, obtusa. *Flores* ♀ subsessiles; perianthii segmenta lanceolata; achaenia oblique ellipsoidea; stylus lateraliter insertus, achaeniis brevior, stigmate longe papilloso. *Flores insectiferi* numerosi, pedicellati.

Ficus rudens, *Hutchinson*; nat. size; base of leaf × 2.

Angola: eastern slopes of Monte de Lau and Monte Bello, *Gossweiler* 4597.

F. maculosa, *Hutchinson;* affinis *F. Pynaerti,* De Wild., sed foliis basi obtusis nec rotundatis, nervis basalibus ascendentibus, pedunculis longioribus differt.

Arbor parva; rami teretes, fructiferi 1·3–2 cm. crassi, cortice cinereo et parce lenticellato; ramuli juniores foliosi, satis graciles glabri. *Folia* oblonga vel oblongo-elliptica, obtuse acuminata, basi obtusa, 9–17 cm. longa, 5–6·5 cm. lata, integra, tenuiter chartacea, utrinque opaca et glabra; costa media supra plana, infra prominens, basi circiter 1·5 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 6–8, a costa sub angulo 75° abeuntes, infra prominentes, marginem versus conjuncti, satis graciles; nervi tertiarii ad laterales subparalleli; veni infra prominentes, laxe reticulati; petioli 2·5 cm. longi, graciles, glabri; stipulae mox caducae, lineari-lanceolatae, acutissime acuminatae, 2 cm. longae, subcoriaceae, glabrae. *Receptacula* 3–5-nata, in ramis efoliatis fasciculata, pedunculata, anguste obovoideo-ellipsoidea, basi stipitata, stipite 2–2·5 mm. longo,

glabra, sicco straminea et maculata, haud verrucosa; pedunculi graciles, 2 cm. longi, contorti et angulares, minutissime puberuli. *Bracteae basales* parvae et caducae, basi oblique connatae et persistentes. *Ostiolum* leviter productum, minutum, poriforme; bracteae omnes in receptacula descendentes, lineares, acutae, ad 4 mm. longae, marginibus membranaceis. *Flores* ♂ stamino solitario inclusi. *Flores* ♀ subsessiles, stigmatibus magnis papillosis. *F. polybractea*, Mildbr. et Burret in Engl. Bot. Jahrb. xlvi. 225, partim.

Togoland: Sokode; Barariruoba Tamberna village, *Kersting* A 545.

F. fasciculiflora, *Hutchinson;* affinis *F. Scheffleri*, Warb., sed nervis lateralibus paucioribus differt.

Arbor 15–18 m. alta; corona lata; rami fructiferi teretes, cortice cinereo obtecti; ramuli juniores graciles, glabri, sicco nigrescentes. *Folia* obovata vel obovato-oblanceolata, sensim acuminata, basi cuneata, 7·5–14 cm. longa, 3–5·5 cm. lata, integra, rigide chartacea, glabra, sicco opaca et rubro-brunnea; costa media supra impressa, infra prominens, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 7–8, a costa sub angulo 45°–70° abeuntes, infra prominentes, prope marginem conjuncti; veni infra tenuiter reticulati, sicco nigrescentes; petioli 2·5–4·5 cm. longi, graciles, glabri vel minutissime puberuli; stipulae caducae, lineari-lanceolatae, longe et acute acuminatae, 2–2·5 cm. longae, glabrae. *Receptacula* in ramis principibus fasciculata, circiter 4-nata, pedunculata, nigro-viridia, maculis parvis et magnis viridibus punctata, ellipsoidea, basi leviter contracta, 1·2–1·5 cm. longa, circiter 0·8 cm. diametro, minute puberla; pedunculi 1·3 cm. longi, satis robusti, minutissime puberuli. *Bracteae basales* ovatae, submembranaceae, glabrae, subpersistentes, demum recurvatae. *Ostiolum* orbiculare, parvum et poriforme; bracteae paucae, omnes in receptacula longitudinaliter descen-

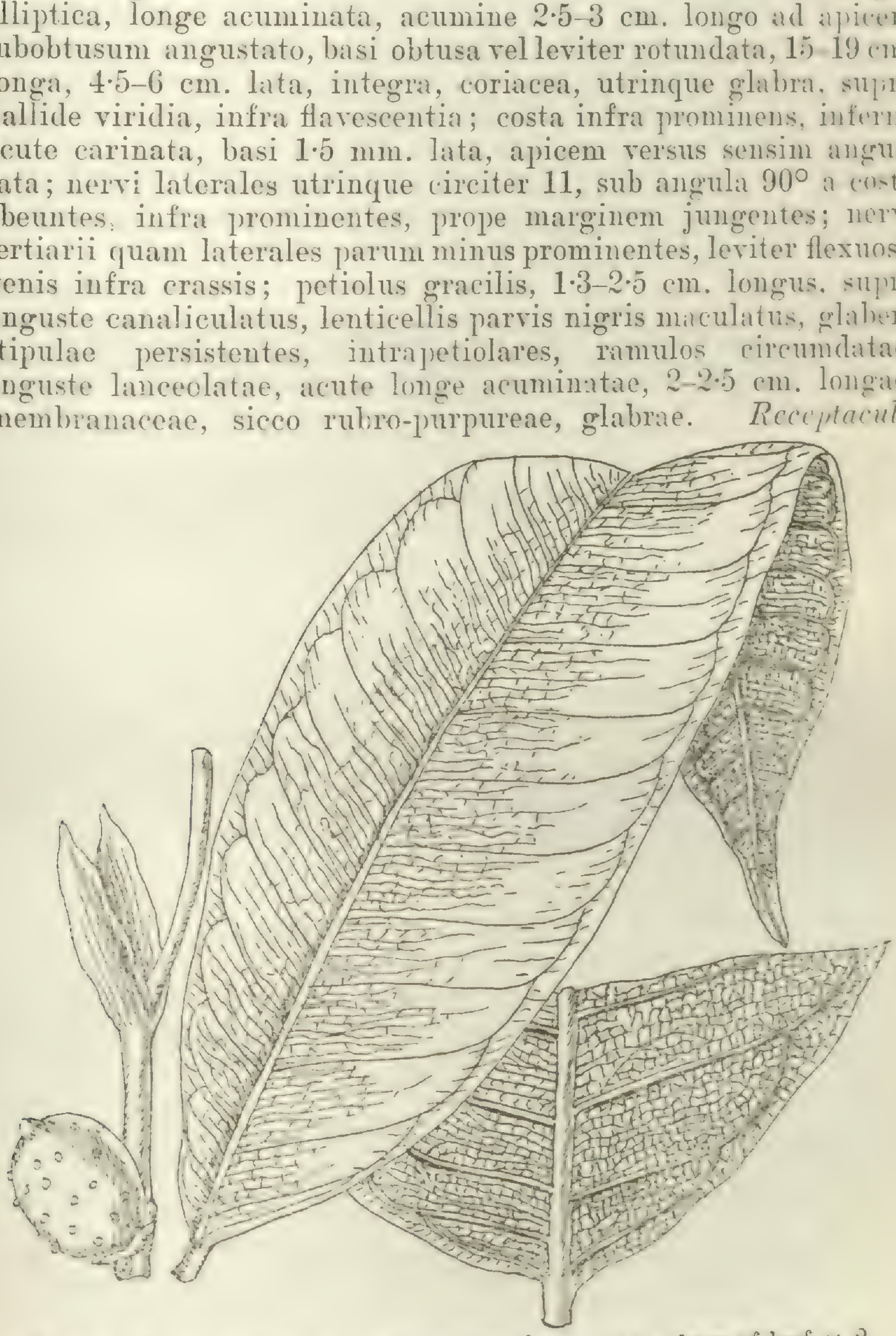
Ficus fasciculiflora, *Hutchinson*; nat. size; base of leaf × 2.

dentes. *Flores* ♂ subsessiles; perianthii segmenta oblanceolata, membranacea, glabra; stamen solitarium; filamentum 1 mm. longum; anthera ovoidea, obtusa. *Flores* ♀ subsessiles. *Flores insectiferi* longe pedicellati.—*F. Gilletii*, Mildbr. et Burret in Engl. Bot. Jahrb. xlvi. 229, partim.

Cameroons: Tibati Lake, *Ledermann* 2410.

F. praticola, *Mildbr. et Hutchinson;* species affinis *F. stipuliferae,* Hutchinson, sed foliis latioribus, receptaculis minoribus distincta.

Frutex epiphyticus, ramulis subacute angulatis circiter 3 mm. diametro glabris cortice cinereo laeve obtectis. *Folia* oblongo-elliptica, longe acuminata, acumine 2·5–3 cm. longo ad apicem subobtusum angustato, basi obtusa vel leviter rotundata, 15–19 cm. longa, 4·5–6 cm. lata, integra, coriacea, utrinque glabra, supra pallide viridia, infra flavescentia; costa infra prominens, inferne acute carinata, basi 1·5 mm. lata, apicem versus sensim angustata; nervi laterales utrinque circiter 11, sub angula 90° a costa abeuntes, infra prominentes, prope marginem jungentes; nervi tertiarii quam laterales parum minus prominentes, leviter flexuosi, venis infra crassis; petiolus gracilis, 1·3–2·5 cm. longus, supra anguste canaliculatus, lenticellis parvis nigris maculatus, glaber; stipulae persistentes, intrapetiolares, ramulos circumdatae, anguste lanceolatae, acute longe acuminatae, 2–2·5 cm. longae, membranaceae, sicco rubro-purpureae, glabrae. *Receptacula*



Ficus praticola, *Mildbr. et Hutchinson*; nat. size; base of leaf × 2.

axillaria, sessilia, estipitata, leviter depresso-globosa, 1·3–2 cm. diametro, ostiolo glabrescente producto, verrucis linguiformibus glabris instructa, strigilloso-pubescentia. *Bracteae basales* 2, basi connatae, ad receptaculum adpressae, suborbiculares, 3 mm. latae, membranaceae, glabrae. *Ostiolum* bilabiatum, extra non bracteatum; os circiter 1·5 mm. latum; bracteae omnes descendentes, lineares, membranaceae, glabrae. *Receptaculi paries* circiter 2 mm. crassus, carnosus. *Flores* ♂ subsessiles; perianthii segmenta 3, ovato-lanceolata, membranacea, glabra, circiter 1·5 mm. longa; stamen unicum; filamentum 1 mm. longum; anthera 1 mm. longa, mucronata. *Flores* ♀ pedicellati, pedicellis ad 2 mm. longis; perianthii segmenta 3, lanceolata, acuta, 1·5 mm. longa, membranacea, glabra. *Achaenia* laevia; stylus gracilis, stigmate magno papilloso. *Receptaculi squamae* subulato-lanceolatae, acutae, 2 mm. longae, superne membranaceae.

Fernando Po: grasslands of Moka, in the south-east of the island, 1200–1800 m., *Mildbraed* 7106.

F. stipulifera, *Hutchinson;* affinis *F. praticolae,* Mildbr. et Hutchinson, quam vidi.

Frutex vel arbor parva; ramuli angulares, parcissime pubescentes cortice cinereo obtecti. *Folia* lanceolata vel lineari-lanceolata, sensim et obtuse acuminata, basi angustata, 7·5–13 cm. longa, 2·5–3 cm. lata, integra, chartacea, supra punctata, utrinque glabra et opaca vel infra leviter nitida; costa media supra plana, infra prominens, basi circiter 1·5 mm. lata, ad laminae apicem sensim angustata; nervi laterales utrinsecus 9–11, a costa sub angulo 90° abeuntes, fere recti, prope marginem conjuncti; nervi tertiarii quam laterales minus prominentes, reticulati, satis laxi, infra distincti; veni infra subindistincti et laxi; petioli 1·3 cm. longi, graciles, glabri, circiter 1 mm. crassi; stipulae persistentes, ramulos juniores subdense indutae, lanceolatae, acutae, usque ad 2 cm. longae, membranaceae, glabrae. *Receptacula* probabiliter axillaria, sessilia? subglobosa, 2·5 cm. diametro, prominenter verrucosa, verrucis sicco rubris, breviter strigilloso-pubescentia. *Bracteae basales* 2, basi connatae, ovato-orbiculares, apice rotundatae, circiter 2·5 mm. longae, fere 4 mm. latae, membranaceae, glabrae. *Ostiolum* haud prominens, bilabiatum, bracteis omnibus in receptacula descendentibus. *Flores* ♂ pedicellati; perianthii segmenta subulato-lanceolata, membranacea, glabra; stamen solitarium, filamento breve, anthera 1–1·25 mm. longa, minute mucronata. *Flores* ♀ pedicellati; perianthii segmenta 3, inaequalia, subulato-lanceolata, acutissima, membranacea. *Achaenia* ellipsoidea, laevia; stylus achaenio paullo brevior, bifidus.

Uganda: South Buddu, 1100 m., *Dawe* 301.

F. camptoneuroides, *Hutchinson;* affinis *F. camptoneurae,* Mildbr., sed receptaculis dense et breviter pubescentibus differt.

Frutex epiphyticus magnus vel arbor parva usque ad 7 m. alta; ramuli graciles, acute angulares vel costati, glabri. *Folia* elliptica vel oblongo-elliptica, sensim et obtuse acuminata,

acumine fere 2 cm. longo, ad basin leviter angustata vel rotundata, 10–16 cm. longa, 4–7 cm. lata, integra, chartacea, utrinque opaca et glabra; costa media supra leviter impressa, infra prominens, basi circiter 2 mm. lata, ad acuminis apicem sensim attenuata; nervi laterales utrinsecus 5, a costa sub angulo 45° abeuntes, arcuati, utrinque prominentes, intra marginem conjuncti; nervi tertiarii ramosissimi, sublaxi, utrinque cum venis arctis prominentes; petioli 1·3–2·5 cm. longi, vix 2 mm. crassi, brevissime et parce pubescentes; stipulae persistentes, lanceolatae, obtusae, 1·2–1·5 cm. longae, basi circiter 4 mm. latae, subchartaceae, glabrae. *Receptacula* axillaria, sessilia, subglobosa, apice paulum complanata, fere 2 cm. diametro, parietatibus tenuibus, breviter et subdense pubescentia. *Bracteae basales* 2, basi connatae, ovatae, apice rotundatae, subchartaceae, basi extra leviter puberulae. *Ostiolum* haud prominens, bilabiatum, circiter 1 mm. latum. *Bracteae* in receptacula descendentes, superiores ovato-lanceolatae, obtusae, inferiores lineari-lanceolatae, subacutae, glabrae. *Flores* ♂ sessiles; perianthii segmenta 2 3, lanceolata; stamen solitarium, anthera fere sessile obtusa. *Flores* ♀ robuste pedicellati; perianthii segmenta 3–4, marginibus membranaceis; achaenia tenuiter et arcte foveolata. *Receptaculi squamae* oblongo-lanceolatae, acutae, circiter 3 mm. longae.—*F. camptoneura*, Mildbr. in Engl. Bot. Jahrb. vol. xlvi. p. 233, partim.

Fernando Po: north side of Pico St. Isabel, *Mildbraed* 6411, 7137.

Cameroons: Neu-Tegel, *Winkler* 167; Niasoso, *Buesgen* 287: Bangwe, *Conrau* 208.

F. nyanzensis, *Hutchinson*; affinis *F. camptoneuroidei*, Hutchinson, differt foliis abrupte et brevissime acuminatis, receptaculis graciliter pedunculatis.

Ramuli juniores costati vel angulares, cortice cinereo tenuiter puberulo obtecti. *Folia* oblanceolata vel oblongo-oblanceolata, brevissime et obtuse acuminata, basi cuneata, 6·5–11·5 cm. longa, 2·5–5 cm. lata, integra, rigide coriacea, utrinque opaca et glabra; costa media supra plana, infra prominens et rotundata, basi circiter 2 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus circiter 5, a costa subangulo 45° abeuntes, prope marginem conjuncti, subgraciles, infra prominentes; nervi tertiarii vix evidentes; veni infra tenuiter reticulati, vix elevati; petioli subrobusti, 1·3-2 cm. longi, glabri; stipulae persistentes, lanceolatae, acutae, usque ad 2 cm. longae, membranaceae, longitudinaliter striatae, glabrae. *Receptacula* axillaria, probabiliter geminata, pedunculata, globosa, vix 1 cm. diametro, sicco sparse nigro-maculata, breviter albo-pubescentia; pedunculi 1–1·3 cm. longi, 1·25 mm. crassi, breviter pubescentes. *Bracteae basales* 2, basi leviter connatae, late ovatae, apice rotundatae, 2·25 mm. longae et latae, tenuiter chartaceae, glabrae. *Ostiolum* bilabiatum, leviter productum, glabrum, 1 mm. diametro; bracteae paucae, omnes in receptacula descendentes. *Flores juniores* tantum visi.

Uganda: Entebbe, near Lake Victoria, *Bagshawe* 690.

F. namalalensis, *Hutchinson;* affinis *F. ebolowensi,* Mildbr. et Hutchinson, sed ramulis glabris, folium venatione infra gracile differt.

Arbor parva; ramuli circiter 5 mm. crassi, cortice laeve pallido obtecti. *Folia* oblonga vel oblongo-elliptica, ad basin leviter angustata vel basi rotundata, apice caudato-acuminata, 14–22 cm. longa, 5–8 cm. lata, acumine 1·3–2 cm. longo, integra, rigide coriacea, utrinque glabra, infra venatione pallide stramineo; nervi laterales utrinsecus 5–6, leviter arcuati, a costa sub angulo circiter 60° abeuntes, infra valde prominentes, intra marginem conjuncti; petioli 2·5–4 cm. longi, robusti, cortice deciduo brunneo obtecti; stipulae persistentes, lanceolatae vel oblongo-lanceolatae, acutae, basi ramulos semi-circumdantes, 2–2·5 cm. longae, circiter 6 mm. latae, membranacae, purpurae, glabrae. *Receptacula* axillaria, probabiliter solitaria vel geminata, depresso-globosa, supra bracteas basales longe stipitata, circiter

Ficus namalalensis, *Hutchinson*; nat. size; base of leaf × 2.

2 cm. diametro, leviter verrucosa, glabra, stipite 5–6 mm. longo fere 2 mm. crasso parce puberulo; pedunculi 4–6 mm. longi, robusti, glabri vel fere glabri. *Bracteae basales* probabiliter 2, plus minusve ovato-ellipticae, mox partim deciduae, membranaceae. *Ostiolum* parvum et poriforme, circiter 1 mm. latum. *Flores* ♂ perianthio membranaceo et stamine unico. *Flores* ♀ subsessiles, insectiferi pedicellati, numerosi.

Uganda: growing around large trees in the Namalala forest, *Fyffe* 77, 83.

F. ebolowensis, *Mildbr. et Hutchinson;* affinis *F. namalalensi,* Hutchinson, quam vidi.

Frutex epiphyticus, ramis sarmentosis; ramuli juniores breviter strigilloso-pubescentes, apice circiter 6 mm. diametro, subteretes, internodiis brevibus. *Folia* oblonga vel leviter oblanceolato-oblonga, caudato-acuminata, acumine obtuso 1·3–2 cm. longo, basi leviter cuneata, 10–20 cm. longa, 3–6·5 cm. lata, integra, rigide coriacea, utrinque opaca et glabra, supra pallide viridia, infra nervis pallidis crassis ornata; costa media supra plana, infra prominens, basi circiter 2 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 6–7, a costa sub angulo 45° abeuntes, 3–4 mm. intra marginem prominenter conjuncti; nervi tertiarii vix evidentes, cum venis infra reticulationem pallide flavum formantes; petioli 2–2·5 cm. longi, crassi, 2·5–3 mm. longi, breviter pubescentes; stipulae persistentes, intrapetiolares, geminatae, basi leviter connatae et ramum circumdantes, ovato-lanceolatae, subacutae, 2–2·5 cm. longae, submembranaceae, striatae, pallide brunneae, extra minute puberulae. *Receptacula* viridia, rubro-brunneo-maculata, axillaria, solitaria? sessilia, supra bracteas basales stipitata, globosa, supra basin rotundata, circiter 1·3 cm. diametro, tenuiter puberula; stipes 3 mm. longus, cylindricus, circiter 1·25 mm. diametro. *Bracteae basales* 2, ovato-orbiculares, mucronatae, 2·5 mm. longae et latae, membranaceae, extra prope basin leviter puberulae, ceterum glabrae. *Ostiolum* bilabiatum, circiter 0·75 mm. longum; bracteae omnes in receptacula descendentes, superiores parvae, inferiores subulato-lanceolatae, hyalinae, glabrae. Flores ♂ subsessiles; perianthii segmenta 3, lanceolata, subobtusa, membranacea, glabra; stamen solitarium, filamento breve, antherae 1 mm. longa obtusa. *Flores* ♀ pedicellati; perianthii segmenta 4–5, lineari-lanceolata, acuta, membranacea; achaenia laevia; stylus non visus.

Cameroons: Ebolowa district; Ekuk, *Mildbraed* 5689.

F. Rederi, *Hutchinson;* affinis *F. cyathistipulae,* Warb., sed nervis lateralibus sub angulo acuto ascendentibus, receptaculis glabris differt.

Ramuli glabri vel leviter puberuli, sicco angulares, cortice cinereo obtecti. *Folia* obovata vel obovato-elliptica, subobtuse acuminata, basi plus minusve cuneata, 9–12·5 cm. longa, 4–6 cm. lata, integra, chartacea, utrinque opaca et glabra, infra venatione pallide flavo ornata; costa media supra plana, infra prominens, basi 2 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus circiter 5, a costa sub angulo 45° abeuntes, marginem versus conjuncti et graciles; nervi tertiarii pauci et

F. namalalensis, *Hutchinson;* affinis *F. cbolowensi*, Mildbr. et Hutchinson, sed ramulis glabris, folium venatione infra gracile differt.

Arbor parva; ramuli circiter 5 mm. crassi, cortice laeve pallido obtecti. *Folia* oblonga vel oblongo-elliptica, ad basin leviter angustata vel basi rotundata, apice caudato-acuminata, 14–22 cm. longa, 5–8 cm. lata, acumine 1·3–2 cm. longo, integra, rigide coriacea, utrinque glabra, infra venatione pallide stramineo; nervi laterales utrinsecus 5–6, leviter arcuati, a costa sub angulo circiter 60° abeuntes, infra valde prominentes, intra marginem conjuncti; petioli 2·5–4 cm. longi, robusti, cortice deciduo brunneo obtecti; stipulae persistentes, lanceolatae vel oblongo-lanceolatae, acutae, basi ramulos semi-circumdantes, 2–2·5 cm. longae, circiter 6 mm. latae, membranacae, purpurae, glabrae. *Receptacula* axillaria, probabiliter solitaria vel geminata, depresso-globosa, supra bracteas basales longe stipitata, circiter

Ficus namalalensis, *Hutchinson*; nat. size; base of leaf × 2.

includens, stigmate satis mago. *Receptaculi squamae* paucae, subulatae, acutissimae, 1·5 mm. longae, membranaceae.

Angola: Malange district, *Gossweiler* 1004.

The difference between the older and younger leaves is very marked and appears to be characteristic of the species.

Ficus mutantifolia, *Hutchinson*; nat. size; portions of leaf × 2.

F. anomani, *Hutchinson:* affinis *F. kamerunensi,* Warb. ex Mildbr. et Burret, sed foliis haud acuminatis nervis lateralibus paucioribus (6–7), receptaculis majoribus differt.

Ramuli satis robusti, sicco purpurascentes, glabri. *Folia* oblonga vel oblongo-oblanceolata utrinque obtusa vel ad basin paulum angustata, 5–11·5 cm. longa, 2·5–4 cm. lata, integra, tenuiter coriacea, utrinque glabra et opaca; costa media supra plana, infra prominens et straminea, basi 2 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 6–7, a costa sub angulo 45° abeuntes, gracillimi, supra indistincti, infra prominentes, prope marginem conjuncti; nervi tertiarii venique vix evidentes; petioli 1·3–3 cm. longi, robusti, supra late sulcati, 2–2·5 mm. crassi, glabri; stipulae persistentes, late ovatae,

acutae, circiter 8 mm. longae, extra glabrae. *Receptacula* axillaria, sessilia, ovoideo-globosa, circiter 1 cm. diametro, tenuiter pubescentia vel fere glabra, ostiolo magno umbonata. *Bracteae basales* 2, parvae, ad receptaculum arcte appressae, membranaceae, glabrae. *Ostiolum* poriforme; bracteae in receptacula descendentes, glabrae. *Flores* ♂ breviter pedicellati; perianthii segmenta obovata, membranacea, glabra; stamen solitarium; anthera lata. *Flores* ♀ sessiles; stylus achaenio aequilongus, gracilis. *Flores insectiferi* pedicellati.

Sierra Leone: near Kukuna, Scarcies River, *Scott Elliot* 4693. Ivory Coast: Lower Cavally River, at Mt. Nienokué, *Chevalier* 19,447; 19,473. Gold Coast: Dimkwa district; Deymase, *Chipp* 151; Schwhi and Wam districts, *Armitage*. Cameroons: near Mundame, *Buesgen* 140.

F. Dawei, *Hutchinson;* affinis *F. eriobotryoidei*, Kth. et Bche., foliis ad medium latissimis ellipticis vel oblongo-ellipticis basi rotundatis vel emarginatis differt.

Ficus Dawei, *Hutchinson*; nat. size; base of leaf × 2.

Arbor usque ad 15 m. alta; ramuli juniores apice foliati, robustissimi, villosi. *Folia* magna, elongato-elliptica vel anguste oblongo-elliptica, breviter et obtuse acuminata, acumine 0·8–1·3 cm. longo, basi rotundata et emarginata, 20–30 cm. longa, 5·5–15 cm. lata, integra, chartacea vel tenuiter coriacea, supra glabra reticulata et opaca, infra praecipue in costa et nervis lateralibus pilosa; costa supra plana vel leviter impressa, infra valde prominens, basi 4 mm. lata, sicco arcte et longitudinaliter costata, ad apicem sensim attenuata; nervi laterales utrinsecus 12–14, a costa sub angulo lato abeuntes, leviter arcuati, prope marginem conjuncti, utrinque distincti, infra prominentes; nervi tertiarii sublaxi, flexuosi; venation utrinque satis arctus et conspicuus; petioli 2·5–7·5 cm. longi, compressi, circiter 5 mm. lati, juniores pilis reflexis villosi, demum puberuli; stipulae caducae, ovatae, longe et acute acuminatae, circiter 2 cm. longae, submembranaceae, extra basin versus pubescentes. *Receptacula* ramulorum apices versus conferta, sessilia, depresso-globosa, 1·3–2 cm. diametro, tenuiter longe pilosa. *Bracteae basales* magnae, receptaculos juniores omnino involventes, extra longe pilosae. *Ostiolum* parvum, poriforme; bracteae omnes in receptacula descendentes, glabrae. *Flores* ♂ breviter pedicellati; stamen solitarium. *Flores* ♀ sessiles; stylus gracilis. Flores *insectiferi* pedicellati.

Uganda: Buddu, 1100 m., *Dawe* 288.

F. clarencensis, *Mildbr. et Hutchinson;* affinis *F. eriobotryoidei*, Kth. et Bouche, differt receptaculis glabris nec tomentosis.

Arbor magna; ramuli robusti, infra apicem circiter 1·3 cm. diametro, parce pilosi. *Folia* oblongo-elliptica, breviter et obtuse acuminata, basi breviter cordata, 15–20 cm. longa, 7·5–10 cm. lata, integra, tenuiter coriacea, supra glabra, infra solum in costa media pubescentia; costa media supra plana, infra valde prominens, basi circiter 4 mm. lata, ad apicem sensim attenuata; nervi laterales utrinsecus 10-12, a costa sub angulo 60°–70° abeuntes, supra leviter impressi, infra prominentes, prope marginem conjuncti; nervi tertiarii inter nervos laterales conjuncti et flexuosi, infra distincti, graciles; veni vix evidentes; petioli 2–5 cm. longi, 4 mm. crassi, cortice deciduo; stipulae caducae. *Receptacula* in calyptro subcoriaceo pubescente inclusa, axillaria, sessilia, depresso-globosa, 2-2·5 cm. diametro, minute et parcissime pubescentia. *Bracteae basales* magnae, receptaculos involventes, extra dense villosae. *Ostiolum* leviter elevatum, bilabiatum; bracteae omnes in receptacula descendentes, glabrae. *Flores* ♂ breviter pedicellati; perianthii segmenta lanceolata, glabra; stamen solitarium. *Flores* ♀ sessiles; stylus brevis. *Flores insectiferi* pedicellati.

Fernando Po: Clarence Peak, to the north of Pico Santa Isabel, 1100-1400 m., *Mildbraed* 6408.

Allied to *F. eriobotryoides*, Kth. & Bche., with quite glabrous receptacles similarly enclosed in large calyptra until nearly ripe, and not tomentose as in that species.

F. kitubalu, *Hutchinson;* species foliis costa media utrinque pubescentia distincta.

Arbor usque ad 8·5 cm. alta vel ultra, habitu frequenter extensa; ramuli juniores apicem versus foliati, satis robusti, sulcati, leviter pubescentes. *Folia* oblonga vel elliptica, utrinque rotundata vel basi leviter angustata, 7·5–10 cm. longa, 4–5 cm. lata, integra, rigide chartacea, supra in costa pubescentia, infra molliter pubescentia; costa utrinque aequaliter prominens, basi circiter 2·5 mm. lata, ad laminae apicem sensim attenuata sed leviter bifurcata; nervi laterales utrinsecus circiter 9, a costa sub angulo lato divergentes, 1–2 mm. intra marginem conjuncti, infra leviter prominentes; nervi tertiarii principes infra quam laterales vix minus prominentes, divergentes, cum venis venationem laxum formantes; petioli 2–2·5 cm. longi, leviter compressi, supra sulcati, breviter pubescentes; stipulae caducae, ovato-lanceolatae, acute et longe acuminatae, 1·3 2 cm. longae, 6–8 mm. latae, squamatae, glabrae, sicco nigrae et opacae. *Receptacula* sessilia, axillaria, geminata, bracteis basalibus magnis fere involventia, globosa, circiter 8 mm. diametro, dense pubescentia vel fere tomentosa. *Bracteae basales* in alabastro receptacula involventes, membranaceae, extra puberulae, intra plus minusve villosae. *Ostiolum* parvum, glabrum, poriforme; bracteae omnes in receptacula descendentes, lineari-lanceolatae, glabrae. *Flores* ♂ subsessiles; stamen solitarium. *Flores* ♀ subsessiles, juniores tantum visi.

Uganda: Buddu, 1200 m., *Dawe* 286.

Mr. Dawe states that this tree, which is called "Kitubalu" by the natives, yields an inferior bark-cloth; it is planted only when other varieties are unobtainable.

F. mallotoides, *Mildbr. et Hutchinson;* affinis *F. ovatae,* Vahl, foliis ovato-orbicularibus vix acuminatis differt.

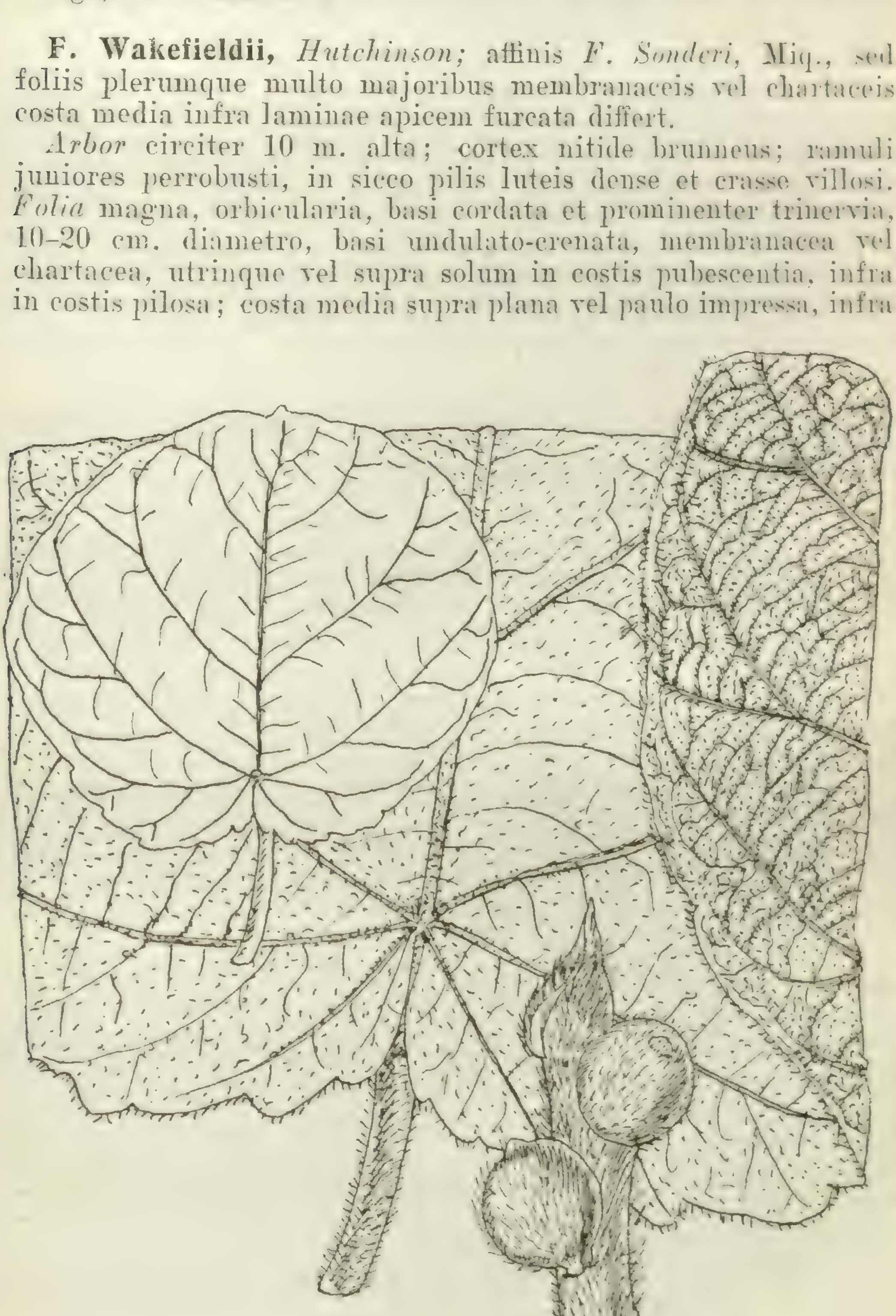
Planta epiphytica, magna; ramuli satis robusti, arcte longitudinaliter sulcati, tenuiter pubescentes. *Folia* late ovata, basi cordata, apice leviter obtusissime acuminata, 14–16·5 cm. longa, 9–12·5 cm. lata, integra, chartacea, utrinque opaca et glabra; costa media supra plana, infra valde prominentia, basi 2 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 10–12, a costa sub angulo 50°–70° abeuntes, inferioribus in latere inferiore ramosis, omnes utrinque distincti, infra subgraciles sed prominentes, intra marginem conjuncti et ramosi; nervi tertiarii divergentes, subflexuosi; veni satis laxi, infra distincti; petioli 4–7·5 cm. longi, circiter 2 mm. crassi, glabri; stipulae subpersistentes, lanceolatae, acute acuminatae, 2 cm. longae, circiter 8 mm. latae, tenuiter papyraceae, extra parce puberulae, intra subtomentellae. *Receptacula* axillaria, sessilia, viridia et rubrobrunneo-maculata, depresso-globosa, 2–2·5 cm. diametro, extra minute subappresse pubescentia, sicco flavescenti-brunnea et verrucosa. *Bracteae basales* mox deciduae. *Ostiolum* bilabiatum, haud prominens; bracteae omnes in receptacula descendentes, duabus prope ostiolum quam ceteris multo majoribus, rigidae, crassae, oblongae, apice truncatae 6 mm. longae,

glabrae, ceteris oblongis vel ovato-oblongis marginibus membranaceis. *Flores* ♂ sessiles; perianthii segmenta 3, inaequalia, oblongo-elliptica, membranacea, glabra; stamen solitarium; filamentum apicem versus incrassatum; anthera oblonga, 1 mm. longa. *Florum* ♀ *perianthii segmenta* ♂ similia; stylus gracilis, in stigmate sensim complanatus.

Cameroons: Molundu district; between Lokomo, Bumba and Bange, *Mildbraed* 4379.

F. Wakefieldii, *Hutchinson;* affinis *F. Sonderi,* Miq., sed foliis plerumque multo majoribus membranaceis vel chartaceis costa media infra laminae apicem furcata differt.

Arbor circiter 10 m. alta; cortex nitide brunneus; ramuli juniores perrobusti, in sicco pilis luteis dense et crasse villosi. *Folia* magna, orbicularia, basi cordata et prominenter trinervia, 10–20 cm. diametro, basi undulato-crenata, membranacea vel chartacea, utrinque vel supra solum in costis pubescentia, infra in costis pilosa; costa media supra plana vel paulo impressa, infra



Ficus Wakefieldii, *Hutchinson*: leaf × ¼; base of leaf and portion of branchlet with figs. nat. size.

valde prominens, frequenter plus minusve flexuosa, infra apicem laminae furcata; nervi basales inter se et marginem nervulis lateralibus 5 prominentibus instructi; nervi laterales utrinque 3–4, e costa media angulo 45° divergentes, infra valde prominentes, 2–4 cm. intra marginem conspicue furcati, tertiariis flexuosis numerosis infra conspicuis, venis infra arcte reticulatis; petiolus robustus, 5–7·5 cm. longus, circiter 4 mm. crassus, pilosus; stipulae caducae, oblongo-ovatae, obtusae, 4–5 cm. longae, 2 cm. latae, membranaceae, in sicco pallide brunneae, parte nuda exteriore piloso-pubescentes. *Receptacula* axillaria, sessilia, geminata, circiter 1 cm. diametro, pilis debilibus pilosa. *Bracteae basales* parvae, densissime villosae. *Ostiolum* leviter rostratum, poriforme, bracteis ovato-lanceolatis glabris in receptacula recte descendentibus. *Flores* ♂ subsessiles; stamen unicum; anthera ellipsoidea, obtusa.—*F. rasta*, Mildbr. et Burret in Engl. Bot. Jahrb. vol. xlvi. p. 216, partim, non Forsk.

German East Africa: Muansa district; Sonjo Sale, *Merker* 430; neighbourhood of Sale Rorehoto, *Uhlig* 254; Victoria Nyanza; Ukerewe, *Conrads* 405; East Tropical Africa; without precise locality, *Wakefield* 34.

F. glumosoides, *Hutchinson;* a *F. glumosa*, Del., foliis orbicularibus recedit.

Arbor ad 6 m. alta; ramuli satis graciles, juniores villosi. *Folia* orbicularia, basi rotundata vel leviter cordata, 5-7·5 cm. diametro, integra, coriacea, supra in costa et nervis lateralibus leviter, infra dense et molliter pubescentia, basi prominenter 5-nervia; nervi laterales ceteri utrinsecus 4, a costa media sub angulo 45° abeuntes, a margine circiter 1·3 cm. distante bifurcati, graciles, infra prominentes; veni infra graciliter reticulati; petioli 2·5–3·8 cm. longi, 2 mm. crassi, tenuiter pilosi; stipulae caducae, non visae. *Receptacula* axillaria, sessilia, ceterum ut in *F. glumosae*, Del.

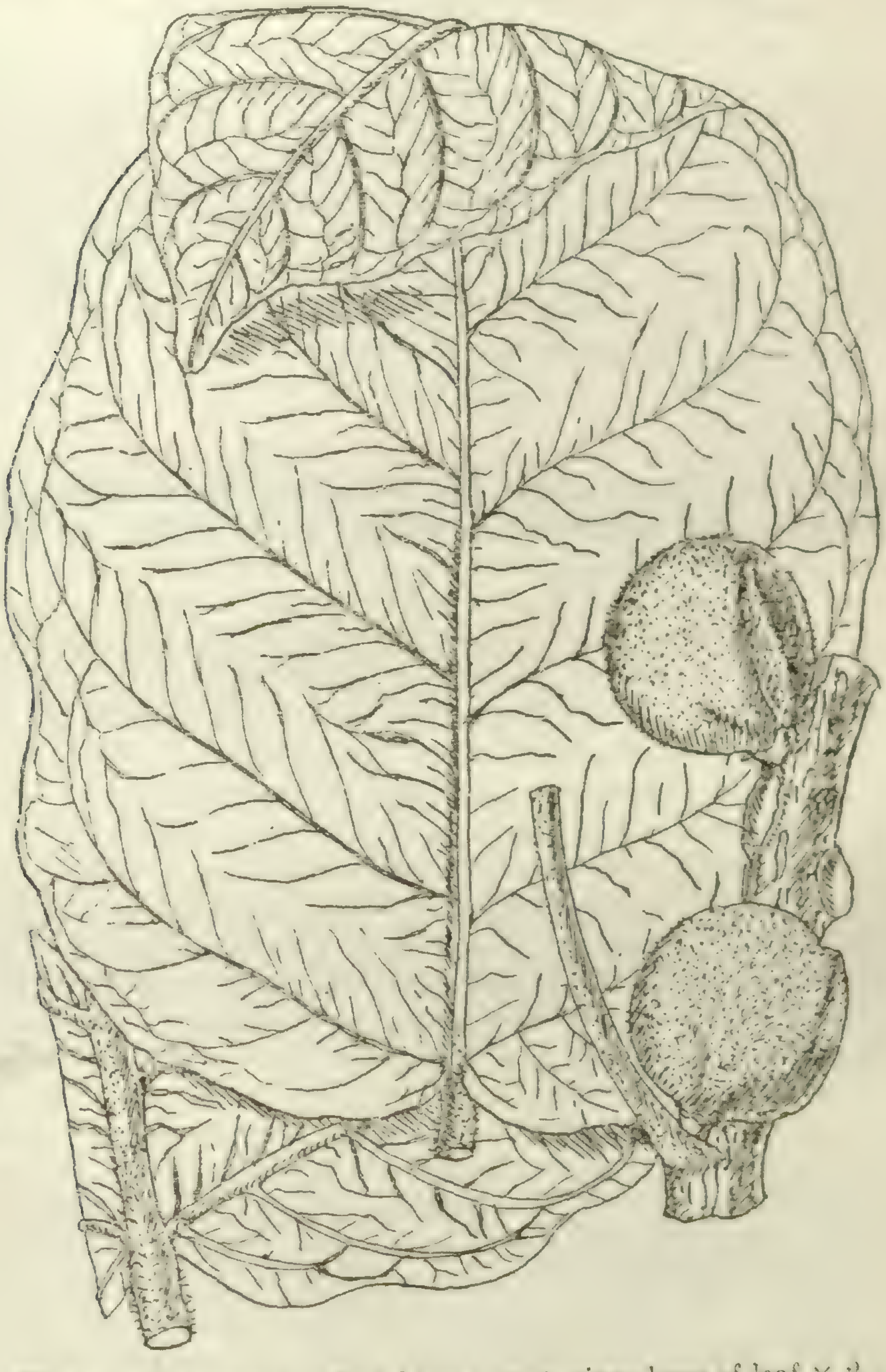
Angola: near native villages in the interior of Noro Redondo, *Gossweiler* 4450.

F. asymmetrica, *Hutchinson;* species foliis magnis infra solum in costa et nervis lateralibus molliter puberulis, receptaculis uno latere profunde canaliculatis asymmetricis distincta.

Arbor magna circiter 22 m. alta; truncus laevis; rami robustissimi, horizontales; ramuli juniores robusti, breviter et molliter puberuli. *Folia* ovata vel ovato-elliptica, brevissime et obtuse acuminata, basi leviter cordata, 12·5–17·5 cm. longa, 7–10 cm. lata, integra, rigide chartacea vel subcoriacea, supra opaca et glabra, infra solum in costa et nervis lateralibus molliter puberula; costa media infra prominens, basi circiter 2·5 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 10–11, a costa sub angulo 50°–80° abeuntes, infra prominentes, subgraciles, prope marginem conjuncti et ramosi; nervi tertiarii graciles, inter nervos laterales reticulationem delicatulum formantes; veni infra delicate reticulati; petioli 2·5–4·5 cm. longi, longitudinaliter sulcati, circiter 3 mm. crassi, molliter puberuli; stipulae caducae. *Receptacula* axillaria, solitaria, sessilia, subglobosa, uno latere profunde fissura, molliter tomentella, circiter

2 cm. diametro. *Bracteae basales* parvae et coricaceae, probabiliter geminatae. *Ostiolum* inconspicuum; bracteae in receptacula descendentes, subulato-lanceolatae, glabrae. *Flores* ♂ breviter pedicellati, perianthii segmentis antheram solitariam oblongam includentibus; filamentum breve, connectivo dorso leviter carinato. *Flores* ♀ numerosi, stylis longis gracilibus et stigmatibus cohaerentibus.

Angola: Cabinda, common tree, *Gossweiler* 122.



Ficus asymmetrica, *Hutchinson*; nat. size; base of leaf × 2.

F. annobonensis, *Mildbr. et Hutchinson*: affinis *F. Lujae*, De Wild., foliis ovato-ellipticis vel ovatis infra medium latioribus differt.

Frutex; rami teretes, fere glabri; ramuli juniores tenuiter puberuli. *Folia* ovato-elliptica vel oblongo-elliptica, breviter et obtusissime acuminata, basi rotundata vel subcordata. 6·5–10 cm.

longa, 3-4·5 cm. lata, integra, chartacea, supra tenuiter verrucosa, infra glabra; costa media supra leviter elevata, infra prominens, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 6-7, a costa sub angulo 45° abeuntes, arcuati, intra marginem conjuncti, utrinque paulum prominentes; veni infra satis arcti et prominentes; petioli 1·3 2 cm. longi, graciles, glabri; stipulae caducae, lineari-lanceolatae, acute acuminatae, 1 cm. longae, glabrae, minute ciliatae. *Receptacula* axillaria, geminata, sessilia, globosa, 8 mm. diametro, glabra. *Bracteae basales* 2, basi connatae, ovatae, obtusae, mox in partibus duabis inaequalibus fissae, 4 mm. longae, coriaceae, extra minute puberulae. *Ostiolum* paulum productum, bilabiatum; bracteae in receptacula descendentes, duabus oblongis obtusis quam ceteris longioribus crassioribusque. *Flores* ♂ subsessiles; perianthii segmenta 3–4, oblongo-elliptica, membranacea, glabra; stamen solitarium. *Flores* ♀ subsessiles; perianthii segmenta quam in flores ♂ ; achaenia ellipsoidea, glabra; stylus achaenio aequilongus, gracilis, stigmate lato complanato.

Annobon Island: on dry hills in the north, above the Palé village, *Mildbraed* 6639.

F. leonensis, *Hutchinson;* affinis *F. aganophilae,* Hutchinson, sed foliis minoribus basi distincte cordatis apice obtuse acuminatis.

Frutex; ramuli sicco brunnescentes, conspicue lenticellati, cortice tenue deciduo glabro obtecti. *Folia* obovata vel suborbicularia, basi leviter cordata, apice obtuse acuminata, 5–12·5 cm. longa, 3–6·5 cm. lata, integra, rigide subcoriacea, utrinque opaca et glabra, sicco supra nigrescentia, infra brunnescentia, infra arcte reticulata; costa media supra plana, infra prominens, basi circiter 1·5 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 9-12, a costa sub angulo lato abeuntes, inferiores oppositi vel subopppositi, conjuncti, infra leviter prominentes; nervi tertiarii infra distincti, cum lateralibus subparalleli; petioli 1·3–2·5 cm. longi. glabri, cortice deciduo obtecti; stipulae caducae, lineari-lanceolatae, 3 mm. longae, glabrae. *Receptacula* axillaria, in foliorum superiorum axillis solitaria, sessilia, globosa, circiter 7 mm. diametro, glabra. *Bracteae basales* 3. ovatae, apice rotundatae, circiter 1·5 mm. longae, coriaceae, glabrae. *Ostiolum* bilabiatum, leviter prominens; bracteae in receptacula descendentes, subulatae vel subulato-lineares, acutae, 1–1·5 mm. longae, carnosulae, glabrae. *Flores* ♂ pauci, subsessiles; perianthii segmenta elliptico-oblanceolata, glabra; stamen solitarium; filamentum 1 mm. longum; anthera post anthesin horizontaliter patula. *Flores* ♀ sessiles; perianthii segmenta triangularia, acuta; achaenia subglobosa, laevia; stylus brevis. *Flores insectiferi* pedicellati.

Sierra Leone: near Bathurst, 160 m., *H. H. Johnston* 88.
French Guinea: neighbourhood of Kindur, *Pobèguin* 1282.

F. aganophila, *Hutchinson;* affinis *F. leonensi,* Hutchinson, quam vidi.

Arbor 15 m. alta; rami et ramuli juniores sicco sulcati, purpurascentes, glabri. *Folia* elliptica vel oblongo-elliptica, basi

rotundata vel subtruncata, apice breviter et subcaudato-acuminta, 9–18 cm. longa, 4·5–9 cm. lata, integra, coriacea, utrinque glabra, supra leviter nitida; costa media supra paulum immersa, infra valde prominens, basi circiter 3 mm. lata, ad acuminis apicem sensim attenuata; nervi laterales utrinsecus 10–12, a costa sub angulo lato divergentes, paulum curvati, 2–4 mm. intra marginem conjuncti; nervi tertiarii cum lateralibus paralleli, prominentes; veni graciles et inconspicui; petioli 1·3–2·5 cm. longi, ad 4 mm. crassi, sicco nigrescentes, glabri; stipulae caducae. *Receptacula* juniora tantum visa, axillaria, probabiliter sessilia.

Nigeria: Grado Lake, *Barter* 3238.

Spanish Guinea: Uelleburg, *Tessmann* 434.

F. arcuato-nervata, *De Wild.* MSS.; species affinis *F. orcodryadum*, Mildbr., foliis longe caudato-acuminatis, receptaculis minoribus distincta.

Frutex epiphyticus; ramuli parce angulati, glabri. *Folia* oblanceolata, sensim acuminata, acumine 1·3–2 cm. longo, apice obtusa, ad basin angustata, 9–13 cm. longa, 3–4 cm. lata, integra, chartacea, supra tenuiter verrucosa, infra glabra; costa media supra plana, infra prominens, basi circiter 2 mm. lata, ad laminae apicem sensim attenuata et gracilis; nervi laterales utrinsecus circiter 5, a costa sub angulo 45° abeuntes, arcuati, intra marginem conjuncti, infra prominentes et pallidi; nervi tertiarii primum cum lateralibus paralleli, gracillimi, demum ramosi, infra distincti; petioli 6–8 mm. longi, cortice glabro tenue transverse fisso deciduo obtecti; stipulae mox caducae. *Receptacula* axillaria, geminata vel interdum solitaria, sessilia, obovoideo-globosa, 6–8 mm. diametro, glabra. *Bracteae basales* 2, plus minusve semiorbiculares, parvae, marginibus membranaceis fissis, glabrae. *Ostiolum* parvum et inconspicuum, bilabiatum; bracteae omnes in receptacula descendentes, lineari-lanceolatae, subacutae, glabrae. *Flores* ♂ sessiles, anthera minima solitaria. *Flores* ♀ sessiles, perianthii segmentis 3 obtusis; achaenia late ellipsoidea; stylus gracilis, stigmate paulum incrassato. *F. camptoneura*, var. *angustifolia*, Mildbr. in Engl. Bot. Jahrb. xlvi. 234; De Wild. in Bull. Soc. Bot. Belg. lii. 202.

Belgian Congo: Ituri district; Kasanga, *Mildbraed* 3107; Lupolo, *Seret* 984; Eala, *Pynaert* 1327; 1504.

F. brachypoda, *Hutchinson;* affinis *F. oratae*, Vahl, sed receptaculis pedunculatis, bracteis basalibus parvis differt.

Arbor divaricata 12–16 m. alta; ramuli breviter puberuli, internodiis circiter 3 cm. longis. *Folia* oblonga vel oblongo-elliptica, caudato-acuminata, basi rotundata, 15–22 cm. longa, 7·5–10 cm. lata, integra, rigide chartacea vel subcoriacea, basi 3-nervia, supra glabra, infra praecipue in costa et nervis lateralibus molliter pubescentia; costa media basi circiter 2·5 mm. lata, ad laminae apicem sensim attenuata, supra plana, infra valde prominens et rotundata; nervi laterales utrinsecus 10–11, suboppositi, a costa sub angulo 45° abeuntes, intra marginem 1·3 cm. bifurcati, supra impressi, infra prominentes; veni supra leviter impressi, infra distincti et arcti; petioli 6–7·5 cm. longi, circiter 2·5 mm.

crassi, longitudinaliter sulcati, molliter pubescentes, sicco nigrescentes; stipulae caducae, non visae. *Receptacula* axillaria, solitaria vel geminata, breviter pedunculata, oblongo-ellipsoidea, basi leviter contracta, circiter 1·5 cm. longa et 1·3 cm. diametro, puberula; pedunculi 6 mm. longi, robustissimi, circiter 4 mm. crassi, sulcati, fere tomentosi. *Bracteae basales* basi in cupulo leviter lobato vel undulato connatae, coriaceae, extra pubescentes, intra glabrae et nitidae. *Ostiolum* vix evidens, poriforme; bracteae in receptacula descendentes, lineari-lanceolatae. glabrae. *Flores* ♂ anthera solitaria.

Uganda: Buddu, 1300 m., *Dawe* 290.

The vernacular name in Buddu is "Kokauwe."

F. Ledermannii, *Hutchinson;* affinis *F. mittuensi,* Warb., et *F. disciferae,* Warb., ab illa ramulis junioribus et foliis infra molliter tomentosis, ab hac indumento, ostiolo prominente et involucri ambitu differt.

Arbor magna 14–16 m. alta, corona lata; ramuli juniores fructiferi prope apicem circiter 6 mm. diametro, molliter tomentosi. *Folia* supra cinereo-viridia, infra cinereo-alba (*Ledermann*), ovato-orbicularia, leviter et obtuse acuminata, basi cordata et sinu lato, 6·5–11·5 cm. longa, 5–11 cm. lata, integra, coriacea, supra opaca glabra et delicate reticulata, infra breviter et molliter pubescentia vel fere tomentella; costa media supra plana, infra prominens, basi circiter 1·5 mm. lata, ad laminae apicem gracillima et sensim attenuata; nervi laterales utrinsecus circiter 8, inferiores recurvati, ceteri a costa sub angulo 45° abeuntes, intra marginem bifurcati, infra prominentes; nervi tertiarii flexuosi, graciles, distincti; petioli 3–6·5 cm. longi, breviter et molliter pubescentes, longitudinaliter sulcati; stipulae caducae, ovato-lanceolatae, acute acuminatae, 2 cm. longae, extra albo-sericeo-pubescentes, intra glabrae et rubescentes. *Receptacula* axillaria, geminata, pedunculata, obovoideo-ellipsoidea, circiter 1·3 cm. longa et diametro, maculata, glabra, sicco laevia; pedunculi 6–8 mm. longi, teretes, circiter 1 mm. crassi, tenuiter et molliter pubescentes. *Bracteae basales* mox caducae, basi in annulo parvo pubescente persistente connatae. *Ostiolum* prominens, parvum, bilabiatum; bracteae paucae, in receptacula descendentes, glabrae. *Flores* ♂ brevissime pedicellati; perianthii segmenta leviter membranacea, glabra; anthera solitaria, obtusa. *Flores* ♀ sessiles; achaenia subglobosa, laevia; stylus lateraliter insertus, gracilis, achaenio paulum brevior. *Flores insectiferi* pedicellati.—*F. abutilifolia*, Mildbr. et Burret in Engl. Bot. Jahrb. xlvi. 214. partim, non Miq.

Cameroons: Lagdo mts., *Ledermann* 4378.

F. budduensis, *Hutchinson;* valde affinis *F. vastae,* Forsk., foliis infra dense molliter tomentosis, receptaculis et pedunculis majoribus differt.

Arbor 6–8 m. alta; ramuli juniores breviter tomentosi, demum parce pubescentes. *Folia* ovata vel ovato-elliptica, basi leviter cordata, apice rotundata, circiter 15 cm. longa et 11 cm. lata,

integra, rigide coriacea, supra in costa puberula, ceterum glabra, infra molliter tomentosa; costa supra plana, infra prominens, basi circiter 2·5 mm. lata, ad apicem sensim attenuata; nervi basales 5, laterales utrinsecus circiter 7, inferiores oppositi, superiores subalternati, a costa sub angulo 45° abeuntes, 1·3–2 cm. intra marginem bifurcati, supra distinctissimi, infra prominentes; nervi tertiarii inconspicui, laxi, flexuosi; petioli 3–4·5 cm. longi, molliter et subdense pubescentes; stipulae caducae, non visae. *Receptacula* axillaria, 2-3-nata, pedunculata, globosa, circiter 2 cm. diametro, laevia, tenuiter puberula; pedunculi 9 mm. longi, robusti, tomentelli. *Bracteae basales* mox deciduae, basi connatae, extra tomentellae. *Ostiolum* bilabiatum, sicco hians, leviter productum, circiter 2 mm. latum; bracteae numerosae, omnes in receptacula descendentes, subaequales, lineari-subulatae, acutae, 2·5 mm. longae, submembranaceae, glabrae. *Flores* ♂ parvi, subsessiles; perianthium membranaceum; stamen solitarium; filamentum usque ad 1·5 mm. longum; anthera subobtusa, 0·75 mm. longa. *Flores* ♀ subsessiles; perianthii segmenta subulato-lanceolata, acute acuminata, membranacea, glabra; achaenia oblonga, 1·5 mm. longa, laevia; stylus achaenio fere aequilongus, stigmate crasso oblongo-lineare.

Uganda: Buddu, 1200 m., *Dawe* 234.

F. zambesiaca, *Hutchinson;* affinis *F. platyphyllae* Del., sed foliis supra pubescentibus differt.

Arbor 20–25 m. alta; truncus 1·5 m. supra basin circiter 2·5 m. diametro; ramuli robusti, internodiis brevibus, juniores molliter tomentosi. *Folia* oblonga vel oblongo-elliptica, basi breviter cordata, apice obtusa, 7·5–20 cm. longa, 4–9 cm. lata, integra, rigide chartacea, utrinque praecipue in costa et nervis lateralibus pubescentia; costa media supra leviter immersa, infra prominens et pilosa, basi 2·5–4 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 8–11, a costa sub angulo 45° abeuntes, utrinque distincti, infra prominentes, prope marginem conjuncti; nervi tertiarii graciles, multo ramosi, laxi, infra prominentes; veni infra inconspicui et tenuiter reticulati; petioli 2–5 cm. longi, pilosi; stipulae caducae, parvae, glabrae vel fere glabrae. *Receptacula* ramulorum juniorum bases versus axillaria, pedunculata, obovoideo-globosa, 2–2·5 cm. diametro, tomentosa; pedunculi 1·3–2·5 cm. longi, dense pubescentes. *Bracteae basales* deciduae, basi in annulo irregulare unilaterale persistente connatae. *Ostiolum* leviter productum, bilabiatum, glabrum, bracteis omnibus in receptacula descendentibus. *Flores* perfecti non visi.

Nyasaland: Shiré Valley at Katunga, Scott. Portuguese East Africa: opposite Senna, on the Zambesi, *Kirk;* Shubanga, *Kirk* 6.

F. tettensis, *Hutchinson;* species foliis parvis subreniformibus pubescentibus distinctissima.

Ramuli juniores divaricati, dense tomentosi, internodiis brevissimis. *Folia* subreniformia vel transverse oblongo-elliptica, basi cordata, 2·5–4 cm. longa, 2·5–5·5 cm. lata, integra vel marginibus undulato-crenatis, rigide coriacea, utrinque molliter tomentosa,

basi prominenter 5-nervia; nervi laterales utrinsecus circiter 3, a costa sub angulo 45°–60° abeuntes, utrinque distincti, infra prominentes, intra marginem bifurcati; veni sub indumentum graciliter reticulati; petioli 1·3–2 cm. longi, teretes, 1·5–2 mm. crassi, dense pubescentes; stipulae caducae, late ovatae, 6 mm. longae, exteriores albo-pilosae. Receptacula in situ non visa sed probabiliter axillaria, pedunculata, leviter depresso-globosa, fere 1·5 cm. diametro, pilis albescentibus dense et molliter tomentosa; pedunculi 0·6 1 cm. longi, circiter 1·5 mm. crassi, dense albo-pubescentes. *Bracteae basales* deciduae, marginem versus membranaceae, basi connatae et persistentes ad receptaculum appressae. *Ostiolum* parvum et inconspicuum; bracteae paucae, omnibus in receptacula descendentibus. *Flores* ♂ breviter pedicellati; perianthii segmenta ovato-lanceolata, subacuta, glabra. *Stamen* solitarium; filamentum breve et robustum; anthera ovoidea. *Flores* ♀ subsessiles; achaenia ovoidea, stylo gracile et stigmate magno. *Flores insectiferi* pedicellati.

Portuguese East Africa: Tette, *Kirk*.

F. pseudo-mangifera, *Hutchinson;* valde affinis *F. mangiferoidei,* Hutchinson, sed pedunculis multo brevioribus tomentosis differt.

Arbor magna, corona fere globosa; ramuli juniores crasse sulcati vel angulares, molliter puberuli. *Folia* oblonga vel oblongo-elliptica, breviter et subacute acuminata, basi obtusa vel leviter rotundata, 7·5–15 cm. longa, 2·5–5 cm. lata, integra, coriacea, glabra; costa media supra plana, infra prominens, basi circiter 2 mm. lata, ad laminae apicem sensim attenuata; nervi laterales utrinsecus 8–12, a costa sub angulo 45° abeuntes, leviter arcuati, prope marginem conjuncti, utrinque distincti, infra prominentes; nervi tertiarii quam laterales vix minus prominentes et eis paralleli; veni infra subareti et distincti; petioli 1·3–2·5 cm. longi, circiter 2·5 mm. crassi, glabri; stipulae caducae ovato-lanceolatae, acuminatae, 6 mm. longae, extra appresse villosae. *Receptacula* axillaria, solitaria, pedunculata, subglobosa, circiter 7 mm. diametro, glabra; pedunculi robusti, 3 mm. longi, tomentosi. *Bracteae basales* 2, rotundatae, membranaceae, glabrae. *Ostiolum* bilabiatum, prominens; bracteae omnes in receptacula descendentes; duae quam ceterae majores et carnosiores, lineari-lanceolatae, obtusae, 3 mm. longae, ceteris subulato-lanceolatis glabris. *Flores* ♂ non visi, sed probabiliter antheram unicam involventes. *Flores* ♀ sessiles, stylis connatis. *Flores insectiferi* pedicellati.—*F. ottoniaefolia*, Mildbr. et Burret in Engl. Jahrb. xlvi. 232, excl. Vogel 176, non Miq.

Liberia: Gola, *Bunting* 13; Mano River, below Ji, *Bunting*. Belgian Congo: west shore of Albert Edward Nyanza, *Mildbraed* 1967. German East Africa: Wau Island, Kiwu Lake, *Mildbraed* 1145.

F. mangiferoides, *Hutchinson;* affinis *F. Barteri*, Sprague, foliis basi rotundatis vel leviter cordatis, receptaculis maturis minoribus, pedunculis gracilibus longioribus differt.

Ramuli satis robusti, angulares, sicco lenticellis nigrescentibus notati, juniores leviter pubescentes, demum glabri. *Folia* oblonga vel oblongo-lanceolata, sensim et subobtuse acuminata, basi rotundata vel leviter cordata, 14–30 cm. longa, 4–8·5 cm. lata, integra, coriacea, utrinque opaca et glabra vel supra leviter nitida; costa media supra plana, infra prominens, basi 2·5 mm. lata, ad laminae apicem sensim attenuata; nervi laterales numerosi, utrinsecus 15–20, a costa sub angulo fere 90° abeuntes, graciles, utrinque distincti, intra marginem circiter 3 mm. conjuncti; nervi tertiarii quam laterales leviter minus prominentes et eis paralleli, utrinque distincti; veni infra areti; petioli breves, 2–2·5 cm. longi, 3–4 mm. crassi, verruculosi, glabri; stipulae caducae, lanceolatae, acuminatae, 2 cm. longae, coriaceae, glabrae vel fere glabrae. *Receptacula* axillaria, pedunculata, depresso-globosa, circiter 7 mm. diametro, sicco verruculosa et parce pubescentia; pedunculi 8 mm. longi, graciles, glabri. *Bracteae basales* caducae, basi persistentes, extra leviter pubescentes. *Ostiolum* minutum, poriforme; bracteae in receptacula descendentes, lineari-lanceolatae, glabrae. *Flores* ♂ anthera solitaria. *Flores* ♀ sessiles, insectiferi pedicellati.—*F. Barteri*, Mildbr. et Burret in Engl. Bot. Jahrb. xlvi. 231, partim, non Sprague.

Cameroons: Bipinde, *Zenker* 1690. Belgian Congo: Monbuttuland; Munza, *Schweinfurth* 3352, partim.

F. Kirkii, *Hutchinson;* affinis *F. cyathistipulae*, Warb., sed stipulis caducis, receptaculis basi rotundatis differt.

Arbor circiter 8 m. alta; ramuli juniores parum angulares, glabri. *Folia* obovato-oblanceolata vel elliptico-obovata, brevissime et obtuse acuminata, ad basin angustata, 9–15 cm. longa, 4–8 cm. lata, integra, coriacea, utrinque glabra et opaca; costa media supra plana, infra prominens, basi circiter 2·5 mm. lata, ad laminae apicem sensim angustata; nervi laterales utrinsecus 8–10, plerumque a costa sub angulo 70°–80° abeuntes, supra vix evidentes, infra prominentes et straminei, prope marginem conjuncti, junctiuris nervum intramarginalem prominens formantibus; nervi tertiarii pauci, laxi, graciles, cum lateralibus subparalleli; veni infra reticulationem gracilem formantes; petioli 1·3–2 cm. longi, circiter 2·5 mm. crassi, glabri; stipulae deciduae. *Receptacula* axillaria, pedunculata, ovoidea, 1·5–2 cm. diametro, ostiolo prominente, leviter verrucosa, minute pubescentia vel glabra; pedunculi 4–7 mm. longi, puberuli. *Bracteae basales* parvae, basi connatae, mox deciduae. *Ostiolum* bilabiatum, hians; bracteae in receptacula descendentes, duae lineares, obtusae, usque ad 6 mm. longae, ceterae subulato-lineares, acute acuminatae. *Flores* ♂ longe pedicellati; pedicelli 2 mm. longi; perianthii segmenta 3, elliptica, subacuta; stamen unicum; filamentum 1 mm. longum, subteres; anthera 1 mm. longa, connectivo crasso. *Flores* ♀ subsessiles; stylus gracilis. *Flores insectiferi* pedicellati, numerosi.

Zanzibar, *Kirk; Sacleux* 2020.

F. Mildbraedii, *Hutchinson;* affinis *F. Scott-Elliotii,* Mildbr. et Burret, foliis longe acuminatis, receptaculis multo minoribus differt.

Frutex magnus epiphyticus; ramuli angulares, apice circiter 6 mm. diametro, glabri. *Folia* oblonga vel oblongo-oblanceolata, caudato-acuminata, acumine obtuso vel subacuto 6–12 mm. longo, ad basin obtusum angustata, 10–16 cm. longa, 4–6 cm lata, integra, rigide coriacea, utrinque glabra et opaca; costa media supra plana, infra prominens et straminea, basi 2·5 mm. lata, ad laminae apicem sensim angustata; nervi laterales utrinsecus 9–11, a costa sub angulo 45° abeuntes, graciles, infra distincti, intra marginem circiter 3 mm. conjuncti; nervi tertiarii venique infra reticulationem densum stramineum formantes; petioli 2–3 cm. longi, subcrassi, sicco angulares, glabri; stipulae caducae. *Receptacula* axillaria, pedunculata, ovoideo-globosa, circiter 1·2 cm. diametro, osticlo prominente, glabra; pedunculi robusti, 6–10 mm. longi, glabri. *Bracteae basales* deciduae, ad receptaculum arcte adpressae. *Ostiolum* poriforme; bracteae in receptacula descendentes, glabrae. *Flores* ♂ stamine unico, ♀ sessiles, insectiferi pedicellati.

Cameroons: Molundu district, *Mildbraed* 4262.

F. Burretiana, *Mildbr. et Hutchinson;* affinis *F. Mildbraedii,* Hutchinson, differt foliis obovatis nervis lateralibus arctis.

Ramuli obscure angulati, glabri. *Folia* oblanceolata vel oblongo-elliptica, breviter et obtuse acuminata, basi obtuse cuneata, 5–9 cm. longa, 2·5–4·5 cm. lata, integra, subcoriacea, utrinque glabra et opaca; costa media subprominens, ad laminae apicem sensim angustata; nervi laterales utrinsecus 11–12, arcti, a costa sub angulo 45° abeuntes, fere recti, intra marginem 2 mm. conjuncti, graciles, infra paulum prominentes; nervi tertiarii cum lateralibus paralleli; veni inconspicui; petioli 2–4 cm. longi, sicco nigro-purpurascentes, glabri; stipulae caducae, lanceolatae, acutae, 6 mm. longae, carnosae, glabrae. *Receptacula* axillaria, geminata, pedunculata, globosa, 8–9 mm. diametro, glabra; pedunculi 8–10 mm. longi, parce et minute puberuli. *Bracteae basales* mox deciduae, ad receptaculum arcte adpressae. *Ostiolum* leviter productum, bilabiatum; bracteae in receptacula descendentes. *Flores* ♂ pedicellati; perianthii segmenta 4, linearia, marginibus membranaceis; stamen unicum; filamentum breve, crassum; anthera oblonga, vix 1 mm. longa. *Achaenia* ovoidea, laevia; stylus gracilis.

Cameroons: Molundu district; between Bange and Jukaduma, *Mildbraed* 4611.

XXXII.—DECADES KEWENSES.

PLANTARUM NOVARUM IN HERBARIO HORTII REGII CONSERVATARUM.

DECAS LXXXVI.

851. **Polygala palustris,** *Lace* [Polygalaceae-Polygaleae]; a *P. triphylla,* Ham., capsulis valde nervosis distinguenda.

Herbu parva, e basi multiramosa, 4–9 cm. alta. *Folia* ovata, acuta, summo apice brevissime apiculata, basi in petiolum angustata, usque ad 2 cm. longa et 1·3 cm. lata, sicco membranacea, viva subcarnosa, pilis paucis brevissimis albis praesertim ad marginem instructa, nervis lateralibus utrinsecus 4-6 subtus prominentibus, integra; petioli 0·5–0·8 cm. longi, graciles, glabri. *Racemi* ad 3 cm. longi, omnino glabri, pedunculo communi 0·5–1 cm. longo; pedicelli vix 1 mm. longi; bracteolae minutae, una persistens. *Sepala* omnia decidua, tria exteriora inter se subaequalia, ovata, concava, apice rotundata, 1–1·5 mm. longa, membranacea, duo interiora aliformia, obovata, apice parum cucullata, basi angustata, circiter 2·5 mm. longa. *Petala* sulphurea, 2 lateralia ultra 1 mm. longa; carina vix 1·5 mm. longa, apice cucullo haud crista instructa. *Capsula* obcordata, 3 mm. lata, conspicue longitudinaliter nervosa, alata, ala valde transverse nervosa; semina nigra, minute tuberculata, glabra, strophiolata.

Indo-China. Burma: Maymyo Plateau; frequent in marshy grass lands and on banks of small watercourses, 1050 m., *Lace* 3239, 5411.

852. **Triumfetta benguetensis,** *Sprague* [Tiliaceae]; affinis *T. suffruticosae*, Blume, a qua foliis utrinque densiuscule stellato-pubescentibus, nervis conspicuis venulis inconspicuis, floribus majoribus in alabastro stellato-pubescentibus, capsulis glabris differt.

Caules pallidi, stellato-pubescentes. *Folia* late ovata, acute acuminata, basi cordata, 8–12 cm. longa, 4–9 cm. lata, dupliciter crenato-serrata, basi subseptemnervia, utrinque subtus densius stellato-pubescentia; nervi conspicui praesertim subtus; venulae inconspicuae; petioli 2–7 cm. longi, dense stellato-pubescentes. *Cymae* ad 6 pro nodo, fasciculatae; pedunculi 0·5–1·5 cm. longi; pedicelli circiter 6 mm. longi, infra medium articulati. *Sepala* lanceolato-oblonga, 1·8 cm. longa, infra medium 1·8–2 mm. lata, supra medium 2·4–2·6 mm. lata, extra stellato-pubescentia, cornubus 1·6–1·7 mm. longis terminata. *Petala* spathulato-obovata, 1·5 cm. longa, 5–6 mm. lata. *Stamina* circiter 40; filamenta 1–1·2 cm. longae; antherae 1·5 mm. longae. *Stylus* 1·6 cm. longus, stamina circiter 4 mm. superans. *Capsula* brunneo-nigra, 5–6-locularis; corpus 5 mm. altum, 8 mm. diametro; aculei basi valde dilatati, 5–8 mm. longi, uncinati. *Semina* pro loculo saepius bina.

Philippine Islands. Luzon: Province of Benguet; Itogon, *Elmer* 8464. *Williams* 1303; Bued River, *Merrill* 4315; Baguio,

853. **Acronychia Barberi,** *Gamble* (Rutaceae-Toddalieae); species *A. laurifoliae*, Blume, affinis, sed ramulis gracilibus, foliis minoribus, floribus in cymarum paniculas nec corymbos brevissime pedunculatos dispositis, petalis et staminum filamentis fere glabris nec albo-villosis minoribus differt.

Arbor parva (?), ramulis gracilibus teretibus purpureis. *Folia* opposita, unifoliolata, glabra; foliola elliptica, apice obtuse acuta, basi cuneata, 4–7 cm. longa, 1·5–3 cm. lata, supra siccitate rubra, infra pallida, nervis utrinque 10–12 gracilibus

primum rectis deinde arcuatim junctis atque iterum marginem versus conspicue reticulantibus; petiolus gracilis, 0·5–1·5 cm. longus. *Flores* in cymarum paniculas axillares dispositi; pedunculus communis gracillimus, 1·5 cm. longus; bracteae foliaceae; pedicelli breves, graciles, bracteolati. *Calycis* lobi 4, ovati, acuti. *Petala* 4, lineari-oblonga, 3–5 mm. longa, apice incurva, utrinque glabra vel intus parce pubescentia. *Discus* cylindricus, 8-lobus, villosus. *Stamina* 8, petala aequantia, alterna paullo breviora; filamenta subulata, glabra vel basi perparce puberula; antherae ovatae. *Ovarium* villosum, 4-lobum, stylo subaequilongo. *Fructus* ignotus. *A. laurifolia*, Blume, var. 4, Hook f. in Fl. Br. Ind. i. 498.

S. India. Madura District; Pulney Hills, *Wight* 364, Sept. 1836; Coimbatore District; Anamalai Hills, *C. A. Barber* 6027, May 1903.

854. **Aglaia Barberi,** *Gamble* (Meliaceae-Trichilieae) *A. Roxburghianae,* Miq., affinis, sed foliolis lanceolatis vel ellipticolanceolatis nec oblanceolatis, longe acuminatis et fructu depressogloboso differt.

Arbor, ramulis lepidotis rufo-brunneis, ultimis corticosoincrassatis. *Folia* imparipinnata, ad 10 cm. longa, foliolis suboppositis 7, siccando rufo-brunneis; foliola lanceolata vel elliptico-lanceolata, 6–12 cm. longa, 2–4 cm. lata, apice longe acuminata, basi acuta vel fere acuminata, vix inaequalia, utrinque glabra vel ad costam lepidota, nervis primariis utrinque circa 12 prope marginem arcuatim junctis, reticulatione obscura; petioluli 3–7 mm. longi. *Inflorescentia* axillaris, ad 8 cm. longa, paniculata, lepidota, floribus minutis pedicellatis; rami permulti, approximati, ramulis ultimis cymosis; bracteae minutae, caducae. *Calyx* patelliformis, lobis brevibus acutis ciliatis. *Petala* oblongo-obovata, glabra. *Tubus* stamineus globosus, margine undulatus; antherae parvae, inclusae, ovatae. *Ovarium* villosum, stylo brevi, stigmate capitato. *Bacca* obovoidea, apice depressa, siccitate rufo-brunnea, 1–1·5 cm. diametro.

India. Madras Presidency: Coimbatore District; Anamalai Hills, Udumanparai, *C. A. Barber* 4113, 5761; Tinnevelly Hills, *Barber*, 2874; Travancore, Parapett Estate, 1000 m., Beddome.

855. **Aglaia Bourdillonii,** *Gamble* (Meliaceae—Trichileae); species distincta, *A. minutiflorae,* Bedd., quodammodo affinis, sed foliolis crassioribus 3-7 nec 15 lepidotis nec tomentosis, inflorescentia multo breviore et aliis notis maxime differt.

Arbor mediocris, ramulis inflorescentia bacca et pagina inferiore foliolorum eximie ferrugineo-lepidotis. *Folia* imparipinnata. ad 25 cm. longa, foliola 7, opposita, oblanceolata, spathulata, 10–12 cm. longa, 2–4 cm. lata, apice obtusa vel obtuse acuta, basi longe cuneata, supra glabra, coriacea, siccitate flavida; infra maxime lepidota, nervis primariis 10–12 supra impressis, reticulatione obscura; petioli 7 cm. longi; petioluli circa 1 cm. longi, ultimus longior. *Inflorescentia*

axillaris, ad 18 cm. longa, paniculata, floribus minutis pedicellatis; pedunculus communis 5 cm. longus; rami patentes, ramulis cymosis; bracteae minutae, caducae. *Calyx* minutus, patelliformis, pubescens, lobis 5 brevibus acutis ciliatis. *Petala* ovata, glabra. *Tubus staminеus* urceolatus margine undulatus; antherae exsertae, obtusae. *Ovarium* stellato-tomentosum, stylo crasso, stigmate parvo. *Bacca* primum subglobosa, deinde obovoidea, ad 2 cm. longa, 12 mm. lata. *Aglaia Roxburghiana*, Bedd. Fl. Sylv. t. 130 var. B., *non* W. et A.

India. Hills of Travancore; Attraymallay Ghát, *Beddome*; various places about 1200 m., *T. F. Bourdillon*.

856. **Aglaia canarensis,** *Gamble* (Meliaceae-Trichilieae) *A. Maiae*, Bourdillon, affinis sed siccando non nigrescens, calycis lobis obtusis ciliatis et floribus sessilibus differt.

Arbor, ramulis lepidotis rufo-brunneis ultimis corticoso-incrassatis. *Folia* imparipinnata, ad 40 cm. longa, longe petiolata; foliola alterna vel subopposita, circa 13, lanceolata, 13-17 cm. longa, 5 cm. lata, apice acuminata, basi paullo inaequaliter obtusa, subrotundata, utrinque glabra vel pagina inferiore ad costam puberula, nervis primariis circa 12-15, secundariis conspicuis, reticulatione obscura; petioluli circa 1 cm. longi, ultimus longior. *Inflorescentia* axillaris, ad 35 cm. longa, paniculata, lepidota; pedunculus ad 15 cm. longus; rami distantes, patentes, ramulis ultimis spicatis; bracteae ovatae; bracteolae sub floribus 3–5, acutae. *Calyx* campanulatus, pubescens, lobis obtusis ciliatis. *Petala* oblonga, glabra, 1-2 mm. longa. *Tubus staminеus* subglobosus, glaber; antherae inclusae, magnae, acutae. *Ovarium* conicum, in stylum brevem productum. *Fructus* ignotus.

India. Madras Presidency; S. Canara Dist. *Beddome* 1873.

857. **Ribes** (§**Berisia**) **Maximowiczii,** *Batalin* var. **floribundum,** *Jesson*. [Saxifragaceae-Ribesieae]; a typo racemis longioribus multifloris (25-floris) fructibus setis glanduliferis paulo tenuioribus multo laxius vestitis differt.

Frutex dioicus, ramosus, elatus, circiter 2 m. altus, inermis; rami ramulique tenuiter pubescentes, vetustiores cortice badio vel fusco obtecti, pilis diu persistentibus. *Folia* forma varia, ovoidea, basi magis minusve cordata, breviter acuminata, plerumque subtriloba vel subquinqueloba, interdum integra, lobo supremo majore, inaequaliter serrato-dentata, 6–10 cm. longa lataque, supra pilis brevissimis parcis obsita, infra molliter pubescentia, nervis prominulis densissime villosis; petioli molliter villosi et praeterea glandulis stipitatis instructi, 2-4 cm. longi. *Racemi* in brachycladiis terminales, deinde ob ramulum e brachycladiis evolutum pseudo-laterales, solitarii, 12-15 cm. longi, plus minusve erecti vel apice subpenduli; squamae scariosae; bracteae lanceolatae, acutae, 5–7 mm. longae, pubescentes et parce glandulosae; pedicelli 3-4 mm. longi, indumento eodem ac bracteae. *Flores* ♂, pelviformes. *Receptaculum* 2 mm. altum. *Calyx* intense fusco-ruber; lobi subrotundi, 2-3 mm. longi. *Petala* minuta, 1 mm. longa, spatulato-unguiculata, ungui lineari, limbo 1 mm. lato. *Stamina* 1 mm.

longa, filamentis paulum dilatatis. *Stylus* ovarii imperfecti profunde bifidus, petalis subaequilongus. *Flores* ♀ in statu anthesis haud noti, calyce et corolla in fructu persistentibus ut in floribus ♂. *Staminodia* filamentis tuberculiformibus receptaculo adnatis. *Fructus* globosus, circa 1 cm. diametro, setis paucis dilatatis 1 mm. longis glanduliferis et pilis tenuibus albis patentibus intermixtis tectus.

Western China. Without precise locality, 2450 m. *E. H. Wilson* 3579, July, 1903.

A specimen was received from Colonel S. R. Clarke, C.B., Borde Hill, Cuckfield, Sussex, who stated that it was of Chinese origin, and believed that it represented "Wilson, 958." The plant was matched with specimens collected by Wilson in 1903, which approach *R. Maximowiczii*, but differ in certain minor points. Since the male and female flowers of *R. Maximowiczii* were so far unknown, it has been deemed desirable to describe them in detail.

858. **Stenocarpha,** *Blake* (Compositae—Heliantheae—Galinsogianae) gen. nov.; *Galinsogae* affinis, a qua receptaculo cylindrico-conico paleis angustissimis squamellis pappi 10 lacerato-fimbriatis alternis truncatis alternis apice abrupte aristatis differt.

Capitula heterogama radiata, floribus radii 1-seriatis femineis fertilibus, disci hermaphroditis fertilibus. *Receptaculum* cylindrico-conicum, paleis linearibus angustissimis subplanis scariosis flores disci subtendentibus. *Involucrum* subbiseriatum, campanulatum, squamis subaequalibus oblongis vel oblongo-obovatis obtusis vel rotundatis submembranaceo-subcoriaceis paullum induratis striatis ciliatis demum reflexis. *Corollae* radii ligulatae patentes, femineae, fertiles, oblongae, regulares, flavidae, sparse pubescentes, faucibus campanulatis tubum superantibus, limbo 5-dentato. *Antherae* flavidae, basi obtuse cordatae, apice appendice ovata obtusa flavida munitae. *Styli* florum disci ramis brevibus obtusis papilloso-hirtellis, non appendiculatis. *Achenia* radii trigona, sparse pubescentia, calva; disci turbinato-obovoidea, nigra, sparse pubescentia, basi callosa, parum incrassata, a latere paullum compressa. *Pappus* e squamellis 10 hyalinis oblongis vel cuneatis vel cuneato-obovatis lacerato-fimbriatis compositus, 5 alternis truncatis 5 alternis apice truncatis abrupte aristatis, aristis tenuibus ciliolatis squamellae longioribus.—Herba annua tenuissima, ramosissima, foliis paucis oppositis radicalibus majoribus, capitulis numerosis minimis filiformiter pedunculatis.

Stenocarpha filipes, *Blake,* comb. nov.

Herba 2·5–4 dm. alta, supra vel e basi ramosissima. *Caulis* tenuissimus, glaber, purpureo-brunneus, striatus. *Folia* radicalia pauca (2–4), oblonga vel oblongo-ovata, acuta vel obtusiuscula, basi cuneata, sparse serrata, tuberculato-hispida, 1-nervia, 1·2–2·7 cm. longa, 0·6–1·1 cm. lata, petiolis marginatis 1·5–6 mm. longis; caulina linearia vel lineari-lanceolata, 2–3·3 cm. longa, 1–3 mm. lata. *Capitula* numerosissima, laxe paniculata, 6·5–10 mm. lata, in pedicellis nudis filiformibus 1·5–6 cm.

longis basi subulato-bracteolatis. *Discus* 2 3 mm. altus, 2–3·8 mm. diametro. *Involucri* subbiseriati 1·8 mm. alti squamae circa 8, ad 0·7 mm. latae. *Radii circa* 6–8, oblongi, in tubo pilosi, 3·8 mm. longi, 1 mm. lati. *Corollae* disci in tubo pilosae, in dentibus et sparse in faucibus pubescentes, 1·2 mm. longae (tubo 0·4 mm). *Paleae* angustissimae, subplanae, acutae, ad apicem obscure appresse spinuloso-serrulatae, 1-nerviae, 1·8 mm. longae, ad 0·15 mm. latae, demum deciduae. *Achenia* radii subglabra, ad 0·7 mm. longa, calva; disci nigra, oppresse pubescentia, 0·4 mm. longa. *Squamellae* pappi 5 truncatae, 0·4 mm. longae, 5 apice abruptissime aristatae, 0·9 mm. longae (arista inclusa). *Galinsoga filipes*, Hemsley, Diagn. Pe Nov. ii. 34 (1879); Bibl. Centr. Am. Bot. ii., 204, tab. 50 (1881).

Mexico. Sinaloa; Carro de Pinal, December, 1848, *Seemann* 1473. Reported also by T. S. Brandegee (Zoe, v., p. 224 (1905)) as abundant in damp soil near Cofradia, Sinoloa.

The genus *Galinsoga*, Ruiz & Pavon, differs from *Stenocarpha* in its merely acutely convex receptacle, broadly linear or oblong pales, uniform more numerous not aristate pappus scales, and larger heads. The characters by which *Stenocarpha* is distinguished were long ago pointed out by Bentham in the Genera Plantarum (ii. p. 390 (1873)), who, however, did not assign to them the generic value which they seem to deserve.

859. **Diospyros glandulosa,** *Lace* [Ebenaceae]; a *D. molli*, Griff., foliis floribusque majoribus recedit.

Arbor dioica, 5–12-metralis, cortice griseo-brunneo parum reticulato-fisso; ramuli purpureo-brunnei, lenticellati, primo densius brunneo-pubescentes, mox glabri. *Folia* alterna, ovata, oblonga, lanceolata oblanceolatave, obtuse acuminata, basi breviter cuneata vel in petiolum gradatim angustata, usque ad 12 cm. longa et 6 cm. lata, chartacea, pagina utraque praesertim ad nervos pubescentia, pilis albis nisi pagina superiore ad nervos brunneis, glandulis rubris caducis instructa, subtus pallidiora; nervi laterales utrinque 5–6, arcuati, intra marginem anastomosantes, supra impressi, subtus prominentes, margine integro; petioli 0·5–1 cm. longi, densius brunneo-pubescentes, basin versus parum canaliculati. *Flores* ♂ in cymas 3–6-floras dense pubescentes dispositi, bracteolis minutis; alabastra late ovoidea. *Calyx* 4–6 mm. longus, tubo intus excepto utrinque albo-pubescens, lobis 4 ovatis vel triangularibus acuminatis 4 mm. longis. *Corolla* lobis puniceis exceptis alba, urceolata, 6–8 mm. longa; lobi 4, contorti, subrotundi, emarginati, 2 mm. longi, parte superiore exteriore loborum et nervo mediano pubescens. *Stamina* saepissime 25, interdum pauciora, per paria connata; filamentum antherae exterioris brevissimum; anthera interior sessilis; antherae parum falcatae, apice acutae. *Flores* ♀ solitarii, pedunculis brevibus validis pubescentibus suffulti. *Calyx* alte 4-fidus; tubus brevissimus; lobi orbiculares, subito breviter acuminati, 1 cm. longi, utrinque pubescentes. *Corolla* pallide lutea, urceolata, circiter 6 mm. diametro, tubo 5 mm. longo, lobis 9 mm. longis iis floris masculi similibus nisi majori-

bus et recurvis. *Staminodia* 12, sessilia, antheris, linearibus acutis villosis. *Ovarium* dense pallide brunneo-pubescens, 8-loculare; styli 4, inferne connati, villosi; stigmata bifida. *Fructus* globosus, 2·5 cm. diametro, luteus, pilis albidis vel pallide brunneis deciduis plus minusve tectus; calyx persistens, accrescens, patulus.

Indo-China. Burma; Maymyo Plateau, 1050 m., *Lace* 3119, 3198, 5191, 5196, 5197. Pegu, *Kurz* 1008.

860. **Arundinaria vagans,** *Gamble* (Gramineae-Bambuseae); species nana, rhizomate late vagante insignis et virgulta densa cito faciens.

Frutex erectus, 1–1·5 m. altus, e rhizomate subterraneo late vagante culmos singulos per intervalla proferens. *Culmi* graciles erecti, fistulosi, prope basim circa 5 mm. diametro, internodiis 12–20 cm. longis teretibus sub nodis albescentibus; cataphylla straminea, 8 cm. longa, 1 cm. lata, glabra, ore truncata et ut lamina perbrevis ciliis paucis cito deciduis munita. *Folia* chartacea, lineari-lanceolata, sub apice setaceo-acuminato contracta, basi rotundata, pilis nonnullis sparsis exceptis glabra, subtus molliter hirsuta, utroque margine scabra, 12–18 cm. longa, 2–2·5 cm. lata; nervi utrinque 5-6, minoribus circa 6-8 interpositis et venulis transversis conspicue sed irregulariter tessellantibus circa 25 per cm.; petiolus 2–3 mm. longus, planus; vaginae striatae, ore ciliis paucis cito deciduis minutae; ligula brevis, rotundata, pubescens. *Flores* ignoti. *A. pygmaea*, Kew Gardens Arboretum List, 2nd ed. 1902, p. 783, non Kurz. *Bambusa pygmaea*, Mitford, The Bamboo Garden, p. 112–113; Bean, Trees and Shrubs, i. 218, et aliorum non Miquel.

A remarkable species growing gradually and quickly into dense thickets of about 1 metre high. Its origin is not known but it is probably from Japan. It has long been cultivated at Kew and elsewhere. Lord Redesdale says of it: "Small as this bamboo is, it is a most determined little vagabond, its rampant rhizomes forcing their way everywhere, especially where they are not wanted, and taking no denial. It is a most valuable plant for making a thick carpet in a wild place, defying all attacks of frost or weather, as happy in winter as in summer, gay and bright at all times of the year, and a deadly foe to weeds; but beware of it in a border; it invades everything, and will soon crowd out less sturdy neighbours. I have even had to dig up a gravel path to get rid of it." (The Bamboo Garden, p. 113.)

XXXIII.—SIR JAMES MURRAY.

S. A. Skan.

It is not our purpose to attempt a biographical sketch of the Editor of *The New English Dictionary*. In many places since his death on July 26th, more or less detailed accounts of his busy and eminently useful life have appeared, and in some of them there are allusions to the Royal Botanic Gardens, Kew, as one of the many sources from which help was obtained in the preparation of his monumental work, help that is fully acknowledged in the prefaces to the various volumes. A note

embodying a few remarks on certain of the words which were the subjects of communications to Kew may be of some interest here, and may at the same time serve as further evidence of the wide range of the activities of the establishment.

Sir James Murray's correspondence began with a postcard dated May 7th, 1887, and continued with here and there a rather long silence till June 9th of the present year. His first inquiry related to the identification of the Cabbage Tree. Several palms, including *Areca* or *Oredoxa oleracea*, *Chamaerops Palmetto*, *Euterpe oleracea*, "whose central unexpanded mass of leaves or terminal bud is eaten like the head of a cabbage," bear this common name.

Burgundy Hay or Burgundy Trefoil was the subject of the next request for help, and with regard to these the Dictionary records that the names have been applied by English writers to the Lucerne, *Medicago sativa*, but in French originally to Sainfoin, *Onobrychis sativa*.

We learn from an inqury of July 21st, 1887, that Calambac is an eastern name of Aloes-wood or Eagle-wood, the product of *Aquilaria Agallocha*, and from a later one that the name Campion was first used by Lobel in 1576, his Rose Campion being the well-known *Lychnis coronaria*.

The earliest record for Calyx was found in the first volume of Malpighi's *Anatome Plantarum* which was published in London in 1675, though the preface is dated 1671. His contemporary, Nehemiah Grew, did not use this word, but Empalement, and this was the practice of many later authors. Calyx reappears in Ray's *Historia Plantarum*, 1686. It is necessary to bear in mind that in Latin there are two very similar but distinct terms, calix, from the Greek *Κύλιξ*, a cup, goblet, drinking vessel, and calyx, from *Κάλυξ*, that which encloses anything, a husk, hull, shell, etc. The Dictionary says that "the two words are to a great extent treated as one by modern scientific writers, so that the calyx of a flower is commonly (though quite erroneously) explained as 'the flower cup,' and the form calyx and its derivatives are applied to many cup-like organs, which have nothing to do with the calyx of a flower, but are really meant to be compared to a calix or cup."

The familiar word Catkin has been part of the English language since 1578, when Lyte, in his translation of Dodoens wrote: "Leaues spring foorth after the Catkins, agglettes, or blowinges." It is derived from the Dutch katteken.

Dr. Murray confessed in May, 1888, that he had never heard of the word Celeriac, and supposed that it was rare. In the Dictionary he states that it does not appear to be known outside of English and records the earliest date for its use as 1743.

In popular language Chestnut may mean either the Horse Chestnut (*Aesculus Hippocastanum*) or the Sweet or Spanish Chestnut (*Castanea satira*), and as poets and other writers have also used the term without sufficient qualification, Dr. Murray, before accepting Tennyson's lines from "The Miller's Daughter"—"Those three chestnuts near that hung in

masses thick with milky cones," as an illustration of the use of the word Chestnut in the sense of Horse Chestnut, cautiously submitted the matter to the Director of Kew. The "milky cones" point to an easy identification.

A letter of November, 1888, expresses the interesting conclusion at which he had arrived as a consequence of his researches into the history of the word Cherry. He did not think that *Prunus Cerasus* or *P. avium* could be native in Britain, for the early native names are from Latin, none Teutonic or Celtic, and he remarked: "Now considering that the Wild Cherry, if native, would be rather an important fruit—as British fruits went—it seems quite improbable that it should have had no name. The Latin name in Old English and in Celtic looks as if it was not known till the Romans introduced tree and name." In connection with this it may be mentioned that Mr. Clement Reid, in his Origin of the British Flora, does not refer to *Prunus Cerasus* at all, but he shows that fossil remains of *P. avium* have been discovered in neolithic deposits in Essex and at Gayfield, near Edinburgh, and in interglacial deposits in Sussex.

Linnaeus named the genus *Cinchona* in commemoration of Lady Ana de Osorio, Countess of Chinchon, who is reputed to have been the first to make known to Europe the healing virtues of its bark, familiar as Peruvian Bark, the source of the quinine of commerce. This being so, several writers, including Sir Clements Markham, who took so important a part in those measures which secured the introduction of the plant into India, pointed out that the name should be Chinchona, and strongly advocated the adoption of this spelling. As a lexicographer Sir James Murray was much concerned about this, because it was not merely that the one word would have to be changed, but may derivates, botanical and chemical, as well. To be consistent all would have to be changed and that he thought would be "a large order." Eventually the word appeared, as Linnaeus wrote it, with a cross-reference from Chinchona.

One letter revealed a doubt in the editor's mind that the name China, as used in *Smilax China*, was really derived from the country. Its unusual form as a specific name surprised him, and was, he said, like using India, Canada or Germania for species. There appears to be no doubt that *Smilax China*, known to Linnaeus as a native of China and Japan, and as the source of Radix China or China Root, owes its name to the country, but in the Dictionary it is stated that the French synonyms of the word China, esquine and squine, and the mod. Lat. schina, point to confusion with some other word. The allusion to the above recalls to mind a letter in which an emphatic protest was directed against the very cumbrous specific names, particularly long hyphenised personal names, given by some botanists.

More than a quarter of a century ago Professor Bayley Balfour (in Ann. Bot. i. 184) called attention to the erroneous use of Cocoa-nut, instead of Coco-nut, for the fruit of *Cocos nuci-*

fera, and referred to the help in the matter which he had obtained from Dr. Murray, who later on discussed the subject in a letter to Kew. It is quite clear that Cocoa-nut is wrong, yet in many publications, including those of some important botanical establishments, this spelling is still used. The mistake is attributed to Dr. Samuel Johnson, who in his Dictionary, confused the Coco-nut (*Cocos nucifera*) with Cocoa (*Theobroma cacao*), though in using the word Cocoa he showed that it came from the Spanish cacaotal, "and therefore more correctly written Cacao." Johnson quotes from Miller's Gardeners' Dictionary and Murray says that Miller wrote Coco Nut, but this statement appears to be incorrect, as no instance of that spelling has been found in his works, but Cocoa nut occurs several times. Miller, however, did not confuse *Cocos* and *Theobroma*, the latter of which appears under Cacao. Prof. Skeat, in his Etymological Dictionary, has "Cocoa, the cocoa-nut palm-tree," and quotes De Barros, Asia, for the origin of the word. It is "called coco by the Portuguese in India on account of the monkey-like face at the base of the nut, from coco, a bugbear, an ugly mask to frighten children." Prof. Skeat explains Cocoa (*Theobroma*) as a corrupt form of Cacao.

The terms Phanerogamia and Cryptogamia, as commonly used, occasioned Dr. Murray some surprise. With regard to the latter he wrote: "Like the names of other Linnean classes and orders, it is a singular noun, and was always so treated in the 18th century; but in the 19th century, probably by unthinking confusion with classes and orders of the animal kingdom (*e.g.*, Vertebrata, Mammalia, Carnivora) which are adjs. neuter plural, it has been (first apparently by persons not botanists, and afterwards by some botanists also) misused as a noun plural Cryptogams."

On one occasion there was a request for the etymology of *Cypripedium* which Sir James regarded as apparently a corruption of Cypripodium, and on another for the dates of introduction of the Red and Black Currants. These appear to have been brought to England some time shortly before 1578, when Lyte, in his edition of Dodoens, referred to Red Currants as "Redde Gooseberries" and "Bastard Corinthes."

Cork, Costmary, Cranberry, Damask-Rose, Passion-flower, Petal, Petunia, Phylloxera, Pipe and Pipe-tree, Plantain, Pompelmoose, Potato, Tangerine, Tea and Tobacco, are a few of the numerous other words about which Sir James Murray wrote to Kew.

The earliest record for Petal (or Petala) is 1704, when Harris used it in his Lexicon Technicum, and the first mention found in any English publication of the terrible vine pest, Phylloxera, was in the *Gardeners' Chronicle* for October 31st, 1868.

It is generally known that *Syringa*, the generic name of the Lilac, is also a popular name for *Philadelphus coronarius*, the Mock Orange. The researches into the applications of the terms Pipe and Pipe-tree, as summarised in the Dictionary, show that Syringa, as a name for the *Philadelphus*, dates at least from

Gerard's *Herball*, 1597. It was, moreover, used as a generic name for the plant by Tournefort and was first published as such in Adanson's *Familles des Plantes* in 1763. However, Linnaeus had before this (in 1735) used the name as now generally understood by botanists. The "Blew Pipe Tree" of Parkinson's Paradisus, 1629, is our *Syringa vulgaris*, the common lilac. His "Single White Pipe Tree" is *Philadelphus coronarius*, of which he says "the flowers . . . are of a strong, full, or heady sent, not pleasing to a great many." Pipe or Pipe-tree was used for the Mock Orange, because, as Gerard says, "the staks and branches thereof, when the pith is taken out, are hollow like a pipe."

Five columns of the Dictionary are occupied by the word Potato with its combinations and derivatives. Dr. Murray, judging from his letters, was perplexed by the statement appearing in accounts of the introduction of the potato into this country, that it was brought from Virginia. "It is generally assumed to have been first brought by the remnant of Raleigh's ill-fated colonists, whom Drake picked up on his way home and brought back to England in 1586. . . . But the question is how these people who lived barely two years in Virginia should have found or grown there a plant belonging to the very antipodes of that part of the American continent. Moreover, there is no later mention of the plant as cultivated there, the plant there grown until about 1800 being the Sweet or Spanish Potato (Batatas), called in America the Carolina P[otato], while *Solanum tuberosum* was at first and still is largely known as Irish Potato, from being introduced by Irish settlers at Londonderry, New Hampshire, in 1719, whence its culture gradually extended into other parts of the North American colonies." Gerard cultivated the plant in 1596, but he was in error in saying that he obtained it from Virginia. It first reached Europe soon after 1580, being introduced into Spain from Quito. It spread from Spain into Italy about 1585, and two years later was grown at Mons in Hainault. It soon appeared in various continental Botanic Gardens, including Breslau, where it was found in 1590. "The plant may have been brought independently to England . . . . but no contemporary statement associating Raleigh's name with the potato has been found."

An exhaustive treatment of the words Tea and Tobacco would, as may be supposed, entail an enormous amount of research, and of this the columns of the Dictionary bear ample evidence. An enquiry addressed to Kew with regard to the latter was: "whether there is any connection between tobacco and the name of the island Tobago?" The Dictionary states that "Columbus gave this island the appellation of Tobago, or Tabago, from a whimsical notion that its form resembled that of a tubical instrument, so called by the Aborigines, with which they inhaled the fumes of tobacco."

During the current year several inquiries have been received from Sir James Murray, the last in a letter dated June 9,

when the botanical names of various Tussock-grasses were in request. In April he submitted to Kew some proof of the Dictionary, asking for information and criticisms with regard to certain combinations of Turkey included in it, and whether we could enlighten him as to the insect which mines under the bark of pear-trees? Further, whether the name of the insect mentioned by some old authors on gardening as the Turk could be identified with Turk, the ethnical or political name? The mining insect may possibly be *Scolytus rugulosus*, but no instance of the application of the name Turk to this could be found. The American plum-weevil (*Conotrachelus nenuphar*) is known, at least in America, as Little Turk, and the identity of Turk in this case with the political name is indicated in the *Century Dictionary*, where it is stated that "it is so called from the crescentic punctures made by the female, in allusion to the emblem of the Ottoman Empire."

Sir James Murray was pre-eminently a philologist, but he was deeply interested in many branches of knowledge, including zoology, geology and botany. His letters often disclosed a desire for more information about plants than was actually required for his Dictionary, and the temptation to seek enlightenment on anything about which he was in doubt seemed as if the Baconian maxim—"He that questioneth much will learn much"—was ever in his mind. He questioned, however, to very little purpose in at least one instance to which he referred in writing to Kew about the Sycamore (*Acer pseudo-platanus*). Amongst its several popular names is that of Plane or Plane-tree, which is perhaps more frequently used in Scotland than in England, and it was the only Plane known to Murray as a boy in the South of Scotland. On seeing the London Plane (*Platanus acerifolia*) for the first time, at Wood Street corner in Cheapside, he confessed to having been puzzled and surprised, and added: "I asked many passers if they could tell me what tree it was. They looked at the tree and then at me and said: 'It's a tree,' or, some of them, 'The tree,' and passed on. I found it out for myself eventually."

In dealing with the many questions received at Kew from its world-wide circle of correspondents it has often been necessary to turn to the famous Dictionary and sometimes to the Editor himself. It is unnecessary to say that he was found as ready to give help as to ask for it.

The passing of the courteous and scholarly Editor of *The New English Dictionary* has deprived Kew of an old and esteemed friend. In his work there remains of him an imperishable memorial.

XXXIV.—MISCELLANEOUS NOTES.

Mr. W. G. Craib, M.A., whose appointment as Assistant for India in the Herbarium was reported in *K.B.* 1909, p. 225, has been selected for appointment as Assistant to the Professor of Botany in the University of Edinburgh, with the status of

University Lecturer on Forest Botany and Indian Forest Trees, Royal Botanic Garden, Edinburgh.

Mr. J. Hutchinson, whose appointment as Assistant for Tropical Africa in the Herbarium, was also reported in 1909 (*K.B.*, l.c.), has been appointed by the Secretary of State for India in Council, with the concurrence of the Secretary of State for the Colonies, Assistant for India in succession to Mr. Craib. The Secretary of State for the Colonies has sanctioned the appointment, as a provisional measure, of Miss M. L. Green, B.Sc., a temporary member of the Technical Staff at Kew since 1st August, 1912, and of Mr. F. Flippance, first appointed to the Kew Staff on 17th November, 1913, to perform conjointly the duties of the Assistant for Tropical Africa in the Herbarium.

Frederick Manson Bailey.—It is with great regret that we have to record the death of the veteran Colonial Botanist of Queensland, Mr. F. Manson Bailey, C.M.G., which occurred at Brisbane on June 25th. Mr. Bailey was in his 89th year, and was working vigorously until within a few days of his death; letters written by him were received at Kew by the mail reaching England at the end of July. F. M. Bailey was born in Hackney on March 8th, 1827, his family having conducted for many years the business of nurserymen and seedsmen in London. With a view to finding a fresh opening for botanical and horticultural enterprise, his father, John Bailey, in 1838 set sail for Australia in the frigate *Buckinghamshire*, of 1500 tons—the largest vessel that had till then sailed to the Antipodes—and landed at Holdfast Bay, South Australia.

John Bailey was appointed Government Botanist and laid out the first botanic garden in Adelaide. Times of stress ensuing in South Australia, however, caused John Bailey to resign his position, and he then established a nursery in which his son Manson helped in the management and control.

The gold rush in Victoria attracted young Manson Bailey, and he abandoned gardening, only to resume his old work on the illness of his father. In 1858 he journeyed to New Zealand and took up land in the Hutt Valley, but was forced to leave on the outbreak of the Maori War, and after a brief stay in New South Wales he landed at Brisbane in 1861, where he established a seed business, which, however, was not a continuous success owing to financial conditions in Queensland.

In 1875 the Queensland Government appointed a committee to inquire into diseases affecting live stock and plants, and F. M. Bailey was appointed to investigate the botanical problems involved. The work was after his own heart, and he travelled far and wide throughout the State and contributed valuable articles dealing with the native grasses of Queensland. His next appointment was the charge of the botanical section of

the Queensland Museum, and in 1881 he was made Colonial Botanist, and so remained until his death, discharging its duties with conspicuous ability and untiring devotion. The distinction of the C.M.G., which was conferred upon him in 1911, was a fitting recognition of his great services to Queensland in the domains of botany and agriculture. His contributions to botanical science are many and cover the purely systematic as well as the economic side of the subject; medicinal and other uses of plants being a source of particular interest to him. His more important publications include "The Flora of Queensland," in seven volumes; "The Handbook of the Ferns of Queensland"; a sketch of the "Economic Plants of Queensland"; "Plants reputed Poisonous and Injurious to Stock," etc., etc.

It may be remembered that in the nineties, when a retrenchment was made in Queensland expenditure, the post of Colonial Botanist was abolished, but such was Mr. Bailey's devotion to his work that he continued to discharge his duties unpaid; public protest, however, was so strong that he was soon reinstated in his former position.

At Kew his loss will be keenly felt. Seldom did the Australian mail fail to bring a letter from him, usually dealing with some difficult question of systematic or economic importance, written to the last in his own hand, and the Herbarium has been greatly strengthened as regards the Queensland flora by the critical specimens received from him from time to time.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the Bulletin:—

Dr. Durham, Eigne Hill, Hereford.—Sample of seeds of *Phaseolus vulgaris* sold in Germany as "Soy beans."

Imperial Commissioner of Agriculture for the West Indies.—A collection of photographs of trees and general views in the Botanic Station, Antigua.

Curator, Botanic Station, Dominica.—Seeds and wood of the "Bois Bambara" (*Diospyros Ebenaster*). Fruits of *Achras Sapota*.

Miss L. H. Bullock, Stewart's Grove, Chelsea. Branch of *Cedrus Libani* from Mount Lebanon.

Mr. Douglas Smith, Erpingham, Norfolk.—Transverse section of stem of *Abies numidica*.

Mr. J. A. Campbell, Arduaine, Lochgilphead.—Planting tool employed in forestry.

Mr. A. J. Orner, Melsetter District, Rhodesia.—Specimens of wood of *Maba Mualala*, *Holstia Swynnertonii*, *Schefflerodendron gazense*, *Loroa Swynnertonii*, *Parinarium Gillettii*, and *Vitex* sp.

Dr. H. B. Guppy, Salcombe, S. Devon.—Picture frame made from one of the buried "Cedar" logs (*Juniperus brevifolia?*) once common in the Furnas Valley of San Miguel in the Azores.

[See *K.B.* 1914, p. 316.]

Mr. J. Hunter, South Hampstead.—Wood of Poplar, in which a piece of rope has become overgrown.

Director of Agriculture, Northern Provinces, Nigeria.—Sample of "Iburu" grain (*Digitaria Iburua*) cultivated as a food crop in N. Nigeria.

Dr. G. Henderson, Otford, Kent.—Specimens of *Calotropis procera*, from Sind, consisting of silky fibre or floss from the fruit, fibre extracted from the stems and netting made therefrom.

Mr. T. Burbidge, Oak Deposits, Ltd., St. Peter's Wharves, Hammersmith.—Planks of oak timber cut from logs recovered from the bed of the River Moksha, Russia.

Mr. A. Chandler, Cumberland Road, Kew.—Follicles and seeds of *Strophanthus gratus*, from the Cameroons.

Lady Church, Shelsley, Kew.—Fruits of Yebb or Yeheb (*Cordeauxia edulis*), seeds of *Cyanotis axillaris* and a sample of Black Burmese Rice.

Mr. S. T. Heard, Rossdohan, Kenmare.—Engraved portrait of H.R.H. Frederick Lewis, Prince of Wales.

Mr. Hugh Richardson, Stockfield-on-Tyne, Northumberland.—Specimen of diseased timber of Larch.

Assistant Superintendent of Agriculture, Southern Provinces, Nigeria.—Natural graft in Orange, Onitsha. J. M. H.

Botanical Magazine for July.—The plants figured are *Echium Perezii*, Sprague (t. 8617); *Polystachya paniculata*, Rolfe (t. 8618); *Meconopsis Prattii*, Prain (t. 8619) and *Rhododendron concinnum*, Hemsl. (t. 8620).

The Echium is a striking species from the Island of Palma, nearly allied to *E. Wildpretii*, H. H. W. Pearson. The leaves, however, are decurrent to the base, and the thyrse is more lax and the style arms longer than in that species. The flower colour is pale pink, while in *E. Wildpretti* it is a pale red. The striking difference in habit is well seen in the photograph published in *K.B.* 1914, pp. 266, 267. The species was introduced to cultivation by Dr. G. V. Perez, of Teneriffe, in 1911.

Polystachya paniculata was discovered by Afzelius in Sierra Leone, and considered by Swartz to be a *Dendrobium*. Its true identity was only established when the type specimen was sent to Kew from Upsala in connection with the preparation of the Flora of Tropical Africa. It has recently been found by Mr. C. B. Ussher in the Mabira Forest, Uganda, and its introduction is due to the late Sir Trevor Lawrence, whose son, Capt. C. T. Lawrence, sent plants from West Africa. The orange-red flowers borne in dense panicles are very striking.

Meconopsis Prattii was originally included first under *M. sinuata*, Prain, and then under *M. rudis*, Prain, but fuller material has shown it to be a distinct species. It is distinguished by its herbaceous foliage, shorter flowering pedicels, white stamens and pale green stigma. A native of Szechuan and Kansu at elevations of 13,000—15,000 ft., its introduction is due equally

to Mr. E. H. Wilson and Mr. F. K. Ward. The plant figured was raised at the Royal Botanic Gardens, Edinburgh.

The rhododendron is one of a number of closely allied forms from China, and it has been found desirable to include under the name *R. concinnum* not only *R. yanthinum*, Bur. & Franch., but *R. Benthamianum*, Hemsl., and *R. coombense*, Hemsl., already figured at t. 8280. The leaves are conspicuously mucronate and densely lepidote below, and the calyx lobes are remarkably polymorphic in shape, sometimes being scarcely present. The plant was collected by Mr. E. H. Wilson at Ta-chien-lu, Western Szechuan, the home also of the other forms included in this species, and the plant figured was presented to Kew in 1908 by Messrs. J. Veitch and Sons.

Botanical Magazine for August.—The plants figured are *Alpinia mutica*, Roxb. (t. 8621); *Rhododendron Soulici*, Franch. (t. 8622); *Corylus mandshurica*, Maxim. (t. 8623) and *Senecio glastifolius*, Linn. f. (t. 8624).

Alpinia mutica is an interesting plant formerly grown in England, but lost to cultivation for many years. Its reintroduction is due to Mr. H. N. Ridley, whilst Director of the Botanic Gardens, Singapore, and the figure has been prepared from a plant sent by him to Kew. The species was described by Roxburgh from Penang in 1810. It was regularly grown at Calcutta, and its introduction to England must have taken place at the time of its discovery, since it is recorded as having been grown in Bayswater before 1812. At the Liverpool Botanic Garden it flowered regularly, but soon after 1828 it became rare, and eventually disappeared from British collections. Its nearest ally is *A. calcarata*, Roxb. but it is distinguished from that species by the differently-shaped labellum with basal hirsute glands instead of spurs as in *A. calcarata*.

The Rhododendron is of remarkable beauty with its rosy-flushed flowers and handsome leaves borne on purple petioles. A native of China, it was collected by Mr. E. H. Wilson at about 12,000 ft. near Ta-chien-lu in Western Szechuan, where it occurs in upland thickets and woods. Our plant was raised from seed presented by Prof. Sargent, Arnold Arboretum, in 1909. *R. Soulici* belongs to the section *Eurhododendron*, the leaves being destitute of glands, and it is easily distinguished from all others by its long-petioled, wide-based leaves, calyx lobes edged with red glands, and flat saucer-shaped flowers.

The Manchurian Hazel belongs to a group having the involucre prolonged into a tube, sometimes as much as $1\frac{1}{2}$ in. long. *C. rostrata* from Eastern North America is very closely allied to *C. mandshurica*, but in the latter the leaves are usually broader and often somewhat deeply lobed in the upper part. Our species is common in the mountains of E. Manchuria, and was first collected in 1855 by Maximowicz near the Amur River. It was introduced to Kew by seed received from the late Dr. Bretschneider in 1882.

Senecio glastifolius is a native of the South African Coast from Riversdale to Algoa Bay. It is nearly allied to *S. multi-*

bracteatus, Harv., but the leaves are not scabrid and the peduncles only slightly bracteate. The flowers are rose-lilac and borne on tall, slender stems.

Forestry in Cyprus.*—A report has been published dealing with forestry matters in Cyprus between the years 1879 and 1914. From this report a good idea can be formed of the adverse conditions under which the forestry officials work, for, in addition to the heavy handicap of an adverse climate, they have almost throughout been hampered by lack of funds. Notwithstanding these drawbacks, however, they have succeeded in establishing plantations in several districts which appear to be successful in two of the main objects—the production of fuel and the amelioration of the climate. Plantation work was begun in Cyprus in 1881 under the direction of M. Madon, and the sum of £5000 was voted for forming plantations with a further sum of £832 for upkeep. In 1883 the vote for upkeep was reduced to £410, with no provision for new plantations. By 1889 the vote was reduced to £78, and remained at that sum until 1892. From that time it was gradually increased until the 1913-14 vote was £2000, with an extra sum of £2132 from surplus balances. The climate, more especially in the summer months, is very hot and dry, therefore the forest officials have had to plant to suit the conditions rather than their own inclinations. The most satisfactory tree for effecting cover on bare hills is *Acacia cyanophylla*, one of the least useful of *Acacias*, but suitable for firewood. Once the ground is covered with this acacia, however, the shade afforded enables seedlings of *Pinus Pinea*, *P. halepensis* and other trees to obtain roothold. In some instances, where considerable areas have been covered by trees, a heavier rainfall has been recorded since 1911. Thus on p. 15, with reference to Salamis plantation which covers an area of three square miles, the total mean rainfall for the seven years 1904–5 to 1910–11 was 14·72 ins., and the total mean rainfall for the two years 1911–12 to 1912–13 was 24·53 ins., the records, however, need to be taken over a longer period to prove whether the increase is really due to tree growth. Swampy land has also been reclaimed by judicious planting. For firewood, *Acacia cyanophylla* is grown on a six-years' rotation, and the result of the 1913 cutting in the Salamis plantation was a net revenue of £1 9s. 5cp. per acre, equivalent to 4s. 8½cp. per acre per annum from land which, previous to planting, was worthless. In Nicosia the price of firewood is 22s. a ton. Numerous photographs give an idea of the country before and after planting, whilst lists of trees indicate failures and successes. W.D.

* A Report on Plantation Work in Cyprus from 1879 to 1914, by A. K. Bovill, Principal Forest Officer.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 8] [1915

XXXV.—ON A COLLECTION OF FUNGI FROM AUSTRALIA AND NEW ZEALAND.

E. M. Wakefield.

(WITH PLATES.)

Cooke's "Handbook of Australian Fungi," published in 1892. together with McAlpine's "Systematic List" of 1895, summarised all that was known at that time with regard to Australian fungi. Since then McAlpine has published much critical work on the Uredineae and lower fungi, especially such as are parasitic, and in other groups scattered additions to the list have been recorded. For Queensland only, a useful enumeration of the species known is given in Bailey's "Comprehensive Catalogue of Queensland Plants" (1909–1913). Apart from such additions, however, very little has been done with regard to the Basidiomycetes since the publication of the two general works mentioned. and the same remarks apply in even greater degree to the fungi of New Zealand, the higher forms of which, as far as known. were brought together in Massee's two papers on the Fungus Flora of New Zealand (Trans. New Zeal. Inst. 1898, 1907). In the case of many species, therefore, it is desirable that previous records should be confirmed or corrected in the light of more recent work. The working out of a collection made by Mr. W. N. Cheesman, of Selby, during the visit of the British Association to Australia in 1914, and presented by him to Kew, has afforded an opportunity of increasing our knowledge as to some species, and also of adding several new records to the already long list of fungi known from the region, while at the same time reducing others to synonymy. Mr. Cheesman succeeded in getting together a considerable collection in the time at his disposal, especially of *Polyporaceae* and *Thelephoraceae*, to which families particular attention was paid. Abundant material was sent of each species, and in addition to those named several others occurred, chiefly species of *Poria*, which at present it has not been possible to name satisfactorily. In the following list both common and less-known species are enumerated, but synonyms are not

(1065.) Wt. 153-601. 1,125. 9/15. J. T. & S. G. 14.

given in the case of those well-known species which have been fully worked out by other authors. In some cases references are given to authors quoting lists of synonyms.

The Mycetozoa collected by Mr. Cheesman form the subject of a separate paper by Miss G. Lister and Mr. Cheesman, published in the Journal of Botany, vol. liii, July, 1915, pp. 203–212.

With regard to the general character of the flora, and the conditions at the time of collecting, Mr. Cheesman kindly contributes the following notes, in which it will be noted that several species are mentioned which are not included in the following list, owing to their not having been preserved.

"The period of dry weather which had existed previous to the visit (August and September) militated against the *Agaricaceae*, but this was compensated for by the profusion of Polypores, which are much more resistant to drought and not so subject to decay. The brilliant red *Trametes cinnabarina* and *Polystictus hirsutus* were everywhere on dead wood, and as plentiful as are *P. versicolor* and *Stereum hirsutum* in Britain. *Schizophyllum commune* was also ubiquitous, but always as a saprophyte. Some observers have noted it as a parasite on sugar-cane, and search was made for it in this rôle, but without success. During the visit to the sugar-cane fields in Queensland it occurred frequently on old, dead and decaying canes, but not on living ones, and the planters stated they had never seen it on living cane.

"Near dwellings, several species of *Coprinus* were seen, notably *C. comatus*, *C. atramentarius*, and *C. plicatilis*, and it was reported that in the moist season the common mushroom grew plentifully in pastures in all the States. In moist gullies Collybias and Mycenas were occasionally seen, but their frail nature did not permit of collection and preservation.

"*Armillaria mellea* was growing on the roots of peaches in the orchards on Mt. Lofty, near Adelaide, and also on the roots of wattles in cleared places in the bush in South Australia, Victoria, and New South Wales, but the small amount of humus in the soil of the bush, due to the work of the various species of ants, would tell against a profusion of terrestrial fungi even in the wet season.

"Forest trees did not appear to suffer very much from the attacks of destructive fungi. In planted pine forests, both in Australia and New Zealand, *Dasyscypha calycina* was well established, and here *Lenzites sepiaria* was found, but was not seen attacking any native trees.

"Other fungi which may be mentioned are *Tremellodon gelatinosum*, which occurred at Moruya, New South Wales, and *Polyporus Mylittae*, a large fresh specimen of which, having a sclerotium nearly a foot in diameter, and several sporophores attached, was shown at Melbourne in the lecture room of the Botanical Section. *Aseroë rubra* was described as occurring frequently about Brisbane in the rainy season."

In the following paper the geographical distribution of the species enumerated is indicated, as far as it has been possible to ascertain it with any degree of certainty, but there is no doubt

that the range of many will be considerably widened with increasing knowledge of the floras of different regions. With regard to the general character of the Australasian fungus flora, however, the present list confirms the temperate type indicated by previous records. Of the 100 species named, 48, or nearly half, occur in Europe or North America, or both, excluding *Irpex flavus*, which, although originally from North America, is typically a tropical species. Of these 48, 12 only are cosmopolitan, the others being for the most part only known from the temperate regions. Of the remaining species, 28 (a large proportion) are, as far as known at present, endemic to the continent of Australasia, including the seven new species, but it is noteworthy that five of these seven species show strong affinities with known species of Europe or North America. The remainder of the list is made up of tropical species, cosmopolitan or common to the tropics of the East and Africa. Two only, *Xylaria apiculata* and *Hymenochaete fuliginosa*, are up to the present recorded only from Tropical America and Temperate South America, but are probably more widely spread. The analysis of the list is as follows—

Common to Europe or North America (12 cosmopolitan)	48
Common to Tropics of East and Africa	16
Cosmopolitan in the Tropics (excluding the 12 common to temperate regions)	6
Common to American Tropics	2
Endemic	28
	100

AGARICACEAE.

Lentinus fasciatus, *Berk.* in Hook. Journ. Bot. 1840, p. 146.
New South Wales. Moruya.
Distrib. Australia, Tasmania.

Panus stipticus, *Fr.* Epicr. p. 399.
South Australia. Mt. Lofty, Adelaide.
Distrib. Europe, North America, Brazil.

Lenzites sepiaria, *Fr.* Epicr. p. 407.
New South Wales. Moruya.
South Australia. National Park, Adelaide.
Distrib. North Temperate Zone.

L. striata, *Fr.* Epicr. p. 406.
South Australia. Angaston.
Distrib. China, India, Malaya, Tropical Africa (Hennings). Tropical America.

L. repanda, *Fr.* Epicr. p. 404.
South Australia. Mt. Lofty, Adelaide.
Distrib. Cosmopolitan in tropical regions.

Schizophyllum commune, *Fr.* Syst. Myc. i. p. 333.
Common everywhere.
Distrib. Cosmopolitan.

POLYPORACEAE.

Polyporus arcularius, *Fr.* Syst. Myc. i. p. 342.
South Australia. Mt. Lofty, Adelaide.
New Zealand. Mamaku, near Rotorua.
Distrib. Cosmopolitan.

P. gilvus, *Fr.* Elench. p. 104.
New South Wales. Moruya.
South Australia. National Park, Adelaide.
Distrib. Cosmopolitan.

Fomes hemitephrus (*Berk.*) *Cooke* in Grevillea, xiv. 1885, p. 21.
New South Wales. Moruya and Blue Mountains.
Queensland. Brisbane.
Distrib. New Zealand.
This species is well marked by the tawny orange colour of the flesh immediately beneath the cuticle, which was noted by Berkeley, although it is not so evident in the fragmentary type specimen as in young and recent collections. Lloyd's record of *Fomes martius*, from Australia, apparently refers to this plant.

F. robustus, *Karst.* Krit. Ofvers. Finl. Basidsv. 1889, p. 467.
New South Wales. Moruya.
Distrib. Europe, Japan, Hawaii (Lloyd), Tropical Africa (Herb. Kew), Western United States (Lloyd).
Setae rare, ventricose, 17–20 × 10–11 μ. Spores hyaline, subglobose, 7·5–8 μ diam. Previously recorded from New South Wales by Lloyd (Letter 38), as growing on *Eucalyptus*, and also on *Hakea* sp. (Letter 50).

Ganoderma applanatum (*Pers.*) *Pat.* in Bull. Soc. Myc. Fr. 1889, p. 67.
Common in Australia and New Zealand.
Distrib. Cosmopolitan.

Polystictus xanthopus, *Fr.* Nov. Symb. p. 74.
New South Wales. National Park, Sydney.
Distrib. Tropics of Old World.

P. conchifer (*Schw.*) *Cooke* in Grevillea, xiv. 1886. p. 79.
New Zealand. Rotorua. On bark at the edge of a pine plantation.
Distrib. North America.

P. pergamenus, *Fr.* Nov. Symb. p. 85.
South Australia. Botanical Gardens, Adelaide.
Victoria. Ballarat.
Distrib. Philippines. North and South America, Mexico.

P. lilacino-gilvus (*Berk.*) *Cooke* in Grevillea, xiv. 1886, p. 82.
Queensland. Enoggera, near Brisbane.
Distrib. Tasmania, New Zealand.

P. floccosus (*Jungh.*) *Fr.* Nov. Symb. p. 79.
Trametes acuta, Cooke in Grevillea. x. p. 132.
New South Wales. Moruya.
Distrib. Malaya.

P. versicolor, *Fr.* Nov. Symb. p. 86
Western Australia. Zoological Gardens, Perth.
South Australia. Mt. Lofty, Adelaide.
New Zealand. Near Lake Takapuna, Auckland.
Distrib. Cosmopolitan.

P. hirsutus, *Fr.* Nov. Symb. p. 86.
Common everywhere.
Distrib. Cosmopolitan.

P. Peradeniae (*Berk. et Br.*) *Cooke* in Grevillea, xiv. 1886, p. 84.
Victoria. Creswick, near Ballarat.
Queensland. Nambour, Blackall Range.
Distrib. India, Ceylon, Malaya, Brazil.
Both specimens on burnt wood. Spores cylindrical, curved, 7–9 × 2·5–4 μ. Cystidia encrusted with crystals, cylindrical or slightly fusiform, blunt at the apex, 20–35 × 5–9 μ.

P. luteo-olivaceus (*Berk. et Br.*) *Cooke* in Grevillea, xiv. 1886, p. 86.
New Zealand. Mamaku, near Rotorua.
Distrib. India, Malaya, Tropical Africa.
These specimens are unusually robust, with thick, swollen, sterile margins. Spores hyaline, cylindric-ellipsoid, straight or slightly curved, 9–10 × 2·5–3·5 μ.

P. tabacinus (*Mont.*) *Fr.* Nov. Symb. p. 93.
South Australia. National Park, Adelaide.
Distrib. Tropics of Old World.

P. cichoriaceus (*Berk.*) *Fr.* Nov. Symb. p. 92.
New South Wales. Moruya.
Distrib. India, Malaya, Polynesia.

Poria vaporaria (*Pers.*) *Cooke* in Grevillea, xiv. 1886, p. 111.
New South Wales. Moruya.
Distrib. Europe, North America, South America, Tasmania, New Zealand.

P. hyposclera, *Berk.* in Cooke, Grevillea x. p. 103.
New South Wales. Katoomba, Blue Mountains.
Distrib. Tahiti, New Caledonia.

P. eupora, *Karst.* in Not. Flor. Faun. Fenn. ix. 1868, p. 360.
New South Wales. Moruya.
Distrib. Europe.

P. hymenocystis (*Berk. et Br.*) *Cooke* in Grevillea, xiv. 1886, p. 112. *Polyporus hymenocystis,* Berk. et Br. Ann. Nat. Hist. Ser. v., vol. iii. 1879, p. 210.
New South Wales. Moruya.
Distrib. Europe.

Trametes cinnabarina, *Fr.* Hym. Eur. p. 583.
Common everywhere.
Distrib. Cosmopolitan.

T. cingulata, *Berk.* in Hook. Journ. Bot. vi. 1854, p. 164.
Victoria. State Nursery, Creswick, near Ballarat.
Distrib. India, Malaya, Tropical Africa, South Africa, Madagascar.

T. ochroleuca (*Berk.*) *Cooke*, Handbook of Australian Fungi, p. 158.
Queensland. Nambour, Blackall Range.
Distrib. Japan, Ceylon, Philippines.

T. lactinea, *Berk.* in Ann. Nat. Hist. x. 1842, p. 373.
New South Wales. Katoomba, Blue Mountains.
Distrib. India, Ceylon, Philippines (form).

T. epitephra, *Berk.* in Journ. Linn. Soc. xiii, 1873, p. 165.
Victoria. Ballarat.
New South Wales. Moruya.
Distrib. New Zealand.

T. Carteri, *Berk.* in Sacc. Syll. ix, p. 196.
South Australia. National Park, Adelaide.
Distrib. India.
Very close to the *Polystictus floccosus*, Jungh., but differing especially in the pale grey pileus and pores.

T. decipiens (*Berk.*) *Bres.* MS. in Herb. Kew.
Hexagonia decipiens, Berk. in Journ. Linn. Soc. xiii. 1873, p. 166.
New South Wales. Moruya.
Distrib. Only known from Australia.
Well marked by the large, elliptical, brown spores, 15–20 × 7·5–9 μ.

Daedalea quercina, *Pers.* Syn. p. 500.
South Australia. Botanic Gardens, Adelaide. On oak stump.
Distrib. Europe, Madagascar, North America.

D. confragosa, *Pers.* Syn. p. 501.
New Zealand. Rotorua. On trunk of willow.
Distrib. Europe, Philippines, North America.

Favolus Rhipidium (*Berk.*) *Sacc.* Syll. vi. p. 397.
New Zealand. Mamaku, near Rotorua.
Distrib. Japan, Bonin Islands, Ceylon, Malaya, North America, South America.

Gloeoporus dichrous (*Fr.*) *Bres.* in Hedwigia, liii. p. 74.
Polyporus dichrous, Fr. Obs. i. p. 125.
New South Wales. Moruya.
Queensland. Enoggera, and Nambour, Blackall Range.
New Zealand. Mamaku, near Rotorua.
Distrib. Europe, Japan, Bonin Islands, Philippines, Tropical Africa, Madagascar, South Africa, North America, West Indies, South America.

Merulius Corium, *Fr.* Elench, p. 58.
South Australia. Adelaide.
Distrib. Europe, India, Malaya, Tasmania, South Africa, North America, South America.

HYDNACEAE.

Irpex brevis, *Berk.* in Hook. Flor. Nov. Zel. ii. p. 181.
Victoria. Botanic Gardens, Melbourne.
Distrib. New Zealand.
The species is very near to *I. zonatus*, Berk. et Br., but is distinguished by the thicker pilei, which are usually imbricated: and by the coarser spines. Spores hyaline, elliptical, 4–5 × 3 μ.

I. flavus, *Kl.* in Linnaea, viii. 1833, p. 488.
South Australia. Mt. Lofty, Adelaide.
Distrib. India, Malaya, Polynesia, Tropical Africa, North America.

I. fusco-violaceus, *Fr.* Elench. i. p. 144.
New South Wales. Moruya.
Distrib. Europe, North America.

I. calcareus (*Cooke et Mass.*) *Wakefield*, comb. nov.
Hydnum calcareum, Cooke et Mass. in Grevillea, xxi. p. 38.
New South Wales. Katoomba, Blue Mountains.
Distrib. Recorded only from Victoria.
Resupinate, rather thick, dirty white or lilac, with a chalky appearance. Spines very crowded, cylindrical, blunt, more or less united at the base, very brittle, and frequently with the apices broken off. Tissue chalk-white. Spores hyaline, broadly elliptical, 4–5·5 × 3–4 μ. Inter-mixed with the basidia are occasional, slightly projecting, smooth cystidia or paraphyses, cylindrical or slightly fusiform, 20–55 × 7–9 μ, blunt at the apex. Hyphae pale, 2–4 μ in diameter.

Odontia scopinella (*Berk.*) *Cooke*, MS. in Herb. Kew.
Hydnum scopinellum, Berk. in Hook. Flor. Nov. Zeland. ii. p. 181. New South Wales. Moruya.
Distrib. New Zealand.
Spores hyaline, cylindrical, slightly curved, usually with two oil-drops, 5–7 × 1·5 μ. Hyphae thick-walled, with clamp-connections at the septa, 3–4 μ in diameter.

Grandinia helvetica, *Fr.* Hym. Eur. p. 627.
Queensland. Nambour, Blackall Range.
Distrib. Europe.

G. australis, *Berk.* in Hook. Flor. Tasm. ii. p. 257.
Hydnum peratum, Mass. in Kew Bull. 1901, p. 157.
New South Wales. National Park, Sydney.
Distrib. Tasmania.
Cinnamon-coloured, the granules varying much in development. The subiculum is cracked when dry, somewhat floeculose, and cinnamon throughout, not white as stated in the original description. The appearance of whiteness in the cracks of the type specimen is due to a deposit of crystals of mineral matter, of uncertain origin. Spores hyaline, elliptical, 5–6 × 3–4 μ.

Phlebia reflexa, *Berk.* in Hook. Journ. Bot. 1851, p. 168.
For synonymy, see Lloyd, Letter 46, pp. 6–7.
New South Wales. Moruya.
Distrib. Japan, India, Malaya, New Zealand, Tropical Africa, Madagascar, North America.

THELEPHORACEAE.

Hymenochaete attenuata, *Lév.* in Ann. sci. nat. sér. 3, v. 1846, p. 152.

New South Wales. Moruya.

Distrib. Japan, Malaya.

Distinguished by its small size, thin flexible pilei, and from *H. rheicolor* by the darker colour of both surfaces. It has also been received at Kew from Mr. F. M. Bailey, of Queensland.

H. villosa (*Lév.*) *Bres.* in Hedwigia, li. 1912, p. 323.

H. strigosa, Berk. et Br. in Journ. Linn. Soc. xiv. 1873, p. 68; *H. spadicea*, Berk. et Br. loc. cit., p. 68. *H. phaea*, Berk. in Cooke, Grevillea, viii. 1880, p. 146.

New South Wales. Moruya.

Distrib. India, Ceylon, Malaya, New Zealand.

Readily distinguished by the dark colour, minutely velvety hymenium, and short spines.

H. tabacina, *Lév.* loc. cit. 1846. p. 152.

New Zealand. Mamaku, near Rotorua. Resupinate specimens only.

Distrib. Europe, North America.

H. tasmanica, *Mass.* in Journ. Linn. Soc. xxvii. 1890, p. 105.

South Australia. National Park, Adelaide.

Distrib. Tasmania. The locality "New Zealand," cited in the original description, is evidently a slip.

A very distinct species, well marked by the habit, and by the possession of rather rigid, more or less dendroid, branched brown hyphae, intermixed with the long pointed spines in the hymenium. The latter follows the inequalities of the matrix and is itself irregularly tuberculose, and minutely velvety under the lens. The whole plant is rather thick and is dark ruddy brown in colour.

H. fuliginosa, *Lév.* loc cit. 1846, p. 152, *sensu Berk.* in Cuban Fungi, Journ. Linn. Soc. x. 1869, p. 335.

New South Wales. Moruya.

Distrib. Cuba, Jamaica, Venezuela, Juan Fernandez.

Resupinate, or with reflexed margin, rather thick, soft in texture, hymenium cracked when old and dry. Hymenium of a peculiar dusky, drab-brown tint, matching Ridgway's "Natal Brown" when in good condition, but becoming more greyish when old. The dark colour of the hymenium is sharply contrasted with the bright, tawny, sterile margin, and the plant is well marked by this character and by its soft, velvety appearance.

The distribution of the species given above is from specimens in the Kew Herbarium verified by the author, but the plant probably occurs throughout the tropics. According to Bresadola (Ann. Myc. 1903, p. 93), it is not the same species as H. *fuliginosa* (Pers.) Bres.

Stereum Schomburgkii, *Berk.* in Journ. Linn. Soc. xiii, 1873, p. 168.
Hymenochaete olivacea, Cooke in Grevillea, xiv. 1885, p. 11.
New South Wales. Nowra.
Distrib. Tropical Africa (*Kew Bull.* 1914, p. 259).

S. umbrinum, *Berk. et Curt.* in Grevillea, i. 1873, p. 164.
Hymenochaete umbrina, B. et C. in Cooke, Grev. viii. 1880, p. 148.
H. vinosa, (Berk.) Cooke in Grev. viii. 1880, p. 149.
H. purpurea, Cooke et Morg. in Journ. Cinc. Nat. Hist. Soc. 1888, p. 198.
H. scabriseta, Cooke in Rav. Fung. Amer. n. 717, 1882.
H. Kalchbrenneri, Mass. in Journ. Linn. Soc. xxvii. 1890, p. 116.
Peniophora intermedia, Mass. in Journ. Linn. Soc. xxv. 1889, p. 143.
Queensland. Brisbane.
Distrib. Poland (Bresadola), Tropical Africa, North America. Central America.

Apparently the species is common in Australia, abundant material having been collected. The Australian specimens received have all been in the purple stage, which was named *H. purpurea.* The author is indebted to Professor E. A. Burt. of the Missouri Botanical Garden, for information as to the great variability of this species as it grows in America, and for the synonymy of the American species cited above.

S. hirsutum, *Fr.* Epicr. p. 549.
New Zealand. Domain Park, Auckland. Abundant specimens.
Distrib. Cosmopolitan.
In the Australasian specimens the pileus and hymenium are usually very bright yellow, more brilliant than in the common European form.

S. vallereum, *Berk.* in Hook. Flor. Nov. Zel. ii. p. 183.
New Zealand. Mamaku and Wairoa, near Rotorua.
Distrib. Japan, Australia, Madagascar. South Africa.

S. Leichkardtianum, *Lév.* (?) in Ann. sci. nat. sér. 3, v. 1846. p. 148.
Victoria. Botanic Gardens, Melbourne.
Distrib. Only known from the type, described from Australia.
The present species is a large and striking form, referred doubtfully to Léveillé's species from the description only. Sporophores rather large, frequently laterally confluent, 2·5–4·5 cm. long, and more or less decurrent behind. Pileus alutaceous to pale brown, zoned, softly velvety-tomentose, or sometimes almost spongy above, margin somewhat wavy or lobed.
Hymenium smooth, pale yellow to buff when dry, bright cadmium yellow when moistened. No cystidia present. Spores hyaline, elliptical, 7–9 × 3–3·5 μ. Hyphae yellowish, rather thick-walled, 2·5 μ in diameter.

S. ceriferum, *Wakefield*, sp. nov.

Pileus 4–8 cm. latus, 2–3 cm. longus, sessilis, postice decurrens interdum omnino resupinatus, umbrinus, concentrice sulcatus et paucis zonis obscurioribus ornatus, adpresse spongioso-tomentosus. *Trama* tenuis, rigida, umbrina. *Hymenium* nigrum, pruina albida velatum, ut caesio-glaucum videtur. *Cystidia* nulla; *basidia* hyalina; *sporae* non visae. *Hyphae* subhymeniales brunneae, tenuiter tunicatae, flaccidae, septatae, saepe ad septa nodosae, 3–5 μ crassae.

Hab. On decaying wood, Rotorua, New Zealand.

A beautiful species, of striking appearance on account of the pruinose hymenium, which appears bluish-grey in colour and contrasts sharply with the umber-brown pileus. The bloom on the hymenium appears to be due to a deposit of a waxy nature, which dissolves on the addition of potassium hydrate solution. The appearance of the upper surface of the pileus resembles that of *S. prolificans*, Berk. (= *S. respilloneum*, Berk.); but the hymenium differs in colour, having no tint of brown, and in the absence of cystidia. The dark-brown basal hyphae, with clamp connections, are also distinctive.

S. illudens, *Berk.* in Hook. Journ. Bot. 1845, p. 59.
S. spiniferum, Lloyd, Letter No. 51, p. 4.
S. Archeri, Berk. in Hook. Flor. Tasm. ii. p. 259.
South Australia. National Park, Adelaide.
Distrib. Tasmania, New Zealand.

"*S. spiniferum*" is the young form of this species, with pileus shortly reflexed, and bright hymenium contracting sharply with the whitish margin. When old, the colour becomes duller and the margin less differentiated. The type of *S. Archeri* is a very old specimen of this species. It appears to be common in Australia, and is easily recognised by the brown, strigose pileus and pinkish-lilac hymenium. Aculeate paraphyses, similar to those of *S. frustulosum*, Fr., are present between the basidia. Figure by Lloyd (loc. cit.)

S. rugosum, *Fr.* Epicr. p. 552.
South Australia. Tamunda.
Distrib. Europe, North America.

S. sanguinolentum, *Fr.* Epicr. p. 549.
New Zealand. Domain Park, Auckland.
Distrib. Europe, North America.

S. rhabarbarinum, *Wakefield*, comb. nov.

Corticium rhabarbarinum, Berk. et Br. in Journ. Linn. Soc. xiv. 1873, p. 69, p.p.; non *C. rhabarbarinum*, Berk. in Hook. Flor. Nov. Zel. ii. p. 184 (= *Hymenochaete rhabarbarina*, Cooke in Grevillea, viii. p. 148).

New South Wales. Nowra.
Distrib. Ceylon.

The type material of "*C. rhabarbarinum*, Berk. et Br.," from Ceylon, consists of two species, namely, this and another which is identical with "*C. reticulatum*, Berk. et Br.," a doubtful *Corticium*. The present species is not a *Hymenochaete*, but a

Stereum, allied to *S. frustulosum*, Fr. The name *Hymenochaete rhabarbarina*, Mass. Journ. Linn. Soc. xxvii. p. 113, is to be deleted, as it refers partly to this species and partly to *H. rhabarbarina*, Cooke.

Entirely resupinate, but sometimes with a thick, upturned margin, hard and rigid. Hymenium cinnamon, cracked into numerous small areas, in habit closely resembling *Hymenochaete unicolor*, Berk. & Curt. (= *H. spreta*, Peck), but differing in the absence of brown setae. Between the basidia are numerous aculeate paraphyses, 15–20 × 5 μ, blunt, cylindrical. Hyphae 2–5 μ in diameter, irregularly branched, septate, scarcely distinguishable, and closely united to form a firm tissue. Sub-hymenial hyphae coloured brown, basal hyphae hyaline or pale yellowish, but brown here and there in patches. Spores not seen.

Peniophora setigera, (*Fr.*) *Bres.* in Bourdot & Galzin. Bull. Soc. Myc. Fr. xxviii. 1912. p. 399.

South Australia. National Park, Adelaide.

Distrib. Europe, North America.

P. cinerea (*Fr.*) *Cooke* in Grevillea, viii. 1879. p. 20.

New Zealand. Manaku, near Rotorua.

Distrib. Europe, North America.

P. velutina (*DC.*) *Cooke* in Grevillea, viii. 1879, p. 21.

New Zealand. Wairoa, near Rotorua.

Distrib. Europe, North America.

P. radicata (*P. Henn.*) *v. Höhnel et Litsch.* Beiträge zur Kenntnis der Corticeen, ii. 1907, p. 8.

Victoria. Ballarat.

Distrib. Europe, Tropical Africa.

P. pubera, (*Fr.*) *Sacc.* Syll. vi. 1888. p. 646.

New South Wales. Katoomba, Blue Mountains.

Distrib. Europe.

P. Cheesmanii, *Wakefield*, sp. nov.

Fungus late effusus, arcte adnatus, ceraceus, ochroleucus, 0·5-0·75 mm. crassus, ambitu similari, interdum leviter reflexo. *Hymenium* laeve, sub lente cystidiis pruinosum. *Cystidia* numerosa, fusiformia, apice fortiter incrustata, 50 × 8–15 μ, plerumque obducta. *Basidia* clavata, 4-sterigmatica, 6-7 μ diametro. *Sporae* laeves, ellipticae, hyalinae, 5·5-6 × 4–4·5 μ. *Hyphae* basales 2·5$\frac{1}{8}$4 μ diametro, flavidae, hyphae contextus stramineae, 2–3·5 μ.

Hab. On bark, Moruya, New South Wales.

Somewhat resembling *P. Molleriana*, Bres. in habit, but differing in the pale brownish subiculum and in the spores.

P. vermicularis, *Wakefield*, sp. nov.

Fungus effusus, albido-griseus, tenuissimus, sub lente cystidiis hispidulus; subiculum fere nullum. *Cystidia* subulata, laevia, sed apice incrustata, crasse apice excepto tunicata, basi bifurcata, 45–70 × 8–14 μ. *Basidia* non visa. *Sporae* fusiformes, utrinque acutae, arcuatae vel flexuoso-vermiculiformes, 9–11 × 2–3 μ. *Hyphae* indistinctae, 1 μ diametro.

Hab. On a fern petiole, Whakarewarewa, near Rotorua, New Zealand.

Very close to *P. vermifera*, Bourdot, in the peculiar spores, but differing especially in the smaller size of the spores and cystidia. The walls of the cystidia are acted on by potassium hydrate solutions in the same way as those of *P. glebulosa*, Bres., to which the present species is also allied.

Corticium confluens, *Fr.* Epicr. p. 564, *sensu Bres.*
Victoria. State Nursery, Creswick, near Ballarat.
Distrib. Europe.

C. luteo-aurantiacum, *Wakefield*, sp. nov.

Fungus effusus, tenuis, ceraceus. *Hymenium* sulphurinum vel ochraceo-aurantiacum, laeve; subiculum ambitusque albida. *Basidia* clavata, 4–sterigmatica, 30–40 × 6–7 μ. Adsunt quoque *cystidiola* numerosa, subulata, apice acuta, granulis aurantiacis incrustata, alia obducta, alia usque ad 36 μ emergentia, 45–50 × 4 5 μ. *Sporae* oblongae, hyalinae, 5 × 2·5–3 μ, uniguttulatae. *Hyphae* basales hyalinae, granulis luteis leviter incrustatae, valde ramosae, septatae, 3–5 μ diametro.

Hab. On wood, Mamaku, near Rotorua, New Zealand.

A beautiful and conspicuous species with its bright yellow colour varying to tawny orange. In the possession of slender crystidioles, it is allied to *C. ochraceo-flavum*, Bourd. & Galz.; but it differs in the more brilliant colouring and softer (less horny) consisteney when dry. The colouring matter is soluble in alkalies, forming a bright yellow solution.

Asterostroma persimile, *Wakefield*, sp. nov.

Fungus late effusus, tenuis. fragilissimus, margino indeterminato; subiculum spongioso-molle, fulvum. *Hymenium* avellaneum, pulverulentum. *Setae* stellatae brunneae, 30–140 μ latae, 3–5 radiatae, radiis 15–75 μ longis, basi 2–7·5 μ crassis. *Gloeocystidia* fusiformia vel ventricosa, apice acuta, 60–100 × 9–12 μ. *Basidia* clavata, 4 sterigmatica, 25–32 × 7 μ. *Sporae* subglobosae, stellato-tuberculosae, hyalinae, 7·5–10 × 6·8 μ. *Hyphae* hyalinae, tenuiter tunicatae, septatae, 2–2·5 μ diametro.

Hab. On wood, Rotorua, New Zealand.

Exactly resembling in appearance *A. cervicolor*, to which species this plant was at first referred. It is also close to *A. cervicolor* in the general type of structure; but differs in the spores, which are angular, with large conical warts like those of *Inocybe asterospora*, instead of being globose with small spines. The stellate hyphae are also somewhat coarser. It might perhaps be regarded as a variety (geographical?) of *A. cervicolor*.

Asterostromella rhodospora, *Wakefield*, sp. nov.

Fungus irregulariter effusus, crassus, subdurus, ochroleucus, margine determinato, concolore vel fulvo. *Hymenium* ob sporis leviter salmoni-tinctum, pulverulentum. *Contextus* ex hyphis tenuissimis, dendroideo-ramosis compositus, superiores hyalinae, basales pallide fulvae. *Gloeocystidia* anguste fusiformia, straminea, non vel vix emergentia, 30–90 × 6–8 μ. *Basidia* clavata,

maturitate emergentia, mox collapsa, 2–4-sterigmatica, 5 μ diametro. *Sporae* subglobosae, verruculosae, roseo-stramineae, 6–6·5 μ.

Hab. On wood, Nambour, Blackall Range, Queensland.

The spores are very abundant and salmon-coloured in the mass, giving a faint salmon tint to the hymenium, which is otherwise pale buff (Ridgway 17′ f. approximately) and very smooth.

Solenia candida, *Pers.* Disp. Meth. Fung. p. 36.
South Australia. Mt. Lofty, Adelaide.
Distrib. Europe, Ceylon, New Zealand, North America.
Spores hyaline, subglobose, 4–5 μ in diameter.

TREMELLACEAE.

Hirneola polytricha (*Mont.*) *Fr.* Fung. Nat. p. 146.
New Zealand. Mamaku, near Rotorua.
Distrib. Cosmopolitan in tropical and subtropical regions.

Tremella mesenterica, *Retz.* in Vet. Akad. Handl. 1769, p. 249.
New Zealand. Rotorua.
Distrib. Europe, North America.

Guepinia spathularia, *Fr.* Elench. ii. p. 32.
New Zealand. Mamaku, near Rotorua.
Distrib. Cosmopolitan in warm climates.

Heterochaete Cheesmanii, *Wakefield.* sp. nov.

Fungus primo orbicularis, deinde effusus, tenuis, membranaceus, secedens, margine interdum leviter reflexo. *Hymenium* pallidum, aculeis minutis, teneris, sparsis, concoloris. *Contextus* fulvus, mollis. *Basidia* elliptica, demum cruciatim 4-septata, 15×10–12 μ, sterigmata 4, 13–30×2 μ. *Sporae* cylindricae, curvatae, 14–15×5–5·5 μ. *Hyphae* basales luteae, 1·5–4 μ, septatae, hinc inde septato-nodosae.

Hab. On wood, Moruya, New South Wales.

Approaching *H. europaea*, v. Höhnel, in the measurement of spores and basidia, but differing in texture and colour.

GASTEROMYCETACEAE.

Clathrus gracilis, *Schlecht.* in Linnaea, xxxi. 1861, p. 166.
New South Wales. Moruya.
Distrib. Only known from Australia.

Crucibulum vulgare, *Tul.* in Ann. sci. nat., sér. 3, i. 1844, p. 90.
New Zealand. Ohinemutu, near Rotorua.
Distrib. Europe, Australia, North America.

Nidula microcarpa, *Peck* in White, Bull. Torr. Bot. Club. xxix. 1902, p. 272.
New Zealand. Mamaku, near Rotorua.
Distrib. North America.

Geaster australis, *Berk.* (?), in Hook. Flor. Tasm. ii. p. 265.
New South Wales. Moruya.
Distrib. Tasmania.
Very close to *G. saccatus*, but differing principally in the larger spores, which are finely warted and 5–8 μ in diameter.

Lycoperdon pusillum, *Fr.* Syst. Myc. iii. p 33.
New South Wales. Moruya.
New Zealand. Mamaku, near Rotorua.
Distrib. Europe, North America.

Pilacre Petersii, *Berk. et Curt.* in Ann. Nat. Hist., 3 ser., iii. 1859, p. 362.
New South Wales. Moruya.
Distrib. Europe, North America.
Named by Miss G. Lister to whom it was sent amongst the Mycetozoa of the collection.

UREDINACEAE.

Uromycladium Robinsoni, *McAlpine* in Ann. Myc. iii. 1905, p. 306.
New Zealand. Rotorua. On phyllodes of *Acacia* sp.
Distrib. Australia.

SPHAERIACEAE.

Eutypella stellulata (*Fr.*) *Sacc.* Syll. i. p. 149.
Queensland. Nambour, Blackall Range.
New Zealand. Rotorua.
Distrib. Europe, North America, South America.

Rosellinia aquila (*Fr.*) *De Not.* in Comm. Soc. Critt. It., No. 4, 1863, p. 227.
Western Australia. Perth.
New Zealand. Mamaku, near Rotorua.
Distrib. Europe, North America.

R. radiciperda, *Mass.* in Kew Bull. 1896, p. 1.
New Zealand. Rotorua.
Distrib. Only known from New Zealand.

Xylaria apiculata, *Cooke* in Grevillea, viii. 1879, p. 66.
Queensland. Brisbane.
Distrib. New Zealand, Brazil (Theissen).

X. castorea, *Berk.* in Hook. Flor. Nov. Zel. ii. p. 204.
New Zealand. Rotorua.
Distrib. Only known from New Zealand.
Spores elliptical, 10×5–5·5 μ.

Poronia punctata, *Fr.* Summ. Veg. Scand. p. 382.
New South Wales. Katoomba, Blue Mountains.
Distrib. Europe, Tasmania, South Africa, South America.

Hypoxylon coccineum, *Bull.* Champ. Fr. p. 174.
New South Wales. Moruya.

New Zealand. Mamaku, near Rotorua.
Distrib. Probably cosmopolitan.
The specimens show young stromata together with the conidial stage, *Isaria umbrina*, Pers.

Daldinia concentrica, *Ces. et De Not.* in Comm. Soc. Critt. It., No. 4, 1863, p. 198.
Queensland. Nambour, Blackall Range.
New Zealand. Rotorua.
Distrib. Cosmopolitan.

Melanomma plagia, *Cooke et Mass.* in Grevillea, xvii., 1888, p. 8.
New Zealand. Mamaku, near Rotorua.
Distrib. Australia.

DISCOMYCETES.

Urnula rhytidia (*Berk.*) *Cooke*, Handbook of Australian Fungi, p. 269. For synonyms and re-description, see Massee, Journ. Linn. Soc. xxxi. 1896, p. 502, and Petch. Ann. Roy. Bot. Gard. Peradeniya, Vol. iv. p. 422.
Western Australia. Perth.
New Zealand. Mamaku, near Rotorua.
Distrib. India, Ceylon (as *Rhizina reticulata*, B. et Br.).

Lachnea coprinaria (*Cooke*) *Phil.* Brit. Discom. p. 224.
Queensland. Nambour, Blackall Range.
Distrib. Europe, North America.

L. coprogena, *Berk. et Br.* in Trans. Linn. Soc. ser. ii., vol. 2, 1883, p. 495. Re-description by Massee in Journ. Linn. Soc. xxxi. 1896, p. 495.
New South Wales. University Grounds, Sydney.
Distrib. Recorded only from Australia.

Orbilia xanthostigma, *Fr.* Summ. Veg. Scand. p. 357.
Victoria. Melbourne.
Distrib. Europe.

DEUTEROMYCETES.

Rhinotrichum pulchrum, *Berk.* in Journ. Linn. Soc. xiii. 1873, p. 175.
South Australia. National Park, Adelaide.
Distrib. Only known from Australia.
Conidia yellowish, elliptical or lemon-shaped, smooth. 15–20 × 12–15 μ. Hyphae hyaline or pale yellowish, 7–8 μ in diameter.

Volutella ciliata, *Fr.* Syst. Myc. iii. p. 467.
New South Wales. Katoomba, Blue Mountains.
Distrib. Europe, South America.

PHYCOMYCETES.

Phycomyces nitens, *Kze.* Mykol. Hefte, ii. 1823, p. 113.
New South Wales. Moruya. On a greasy wooden box.
Distrib. Europe, New Zealand, North America.

Explanation of Plates.

All figures × about 650.

Plate I.

Fig. 1. *Peniophora vermicularis*, n. sp. *a* Cystidium. *b* Spores.
Fig. 2. *Asterostroma persimile*, n. sp. *a* Portion of hymenium. *b* Spores. *c* Gloeocystidium. *d* Brown stellate hypha from tissue.
Fig. 3. *Asterostromella rhodospora*, n. sp. *a* Section through hymenium. *b* Spores. *c* Gloeocystidium. *d* Branched hypha from tissue.
Fig. 4. *Heterochaete Cheesmanii*, n. sp. *a* Two basidia of different ages. *b* Spores, one of which is germinating.

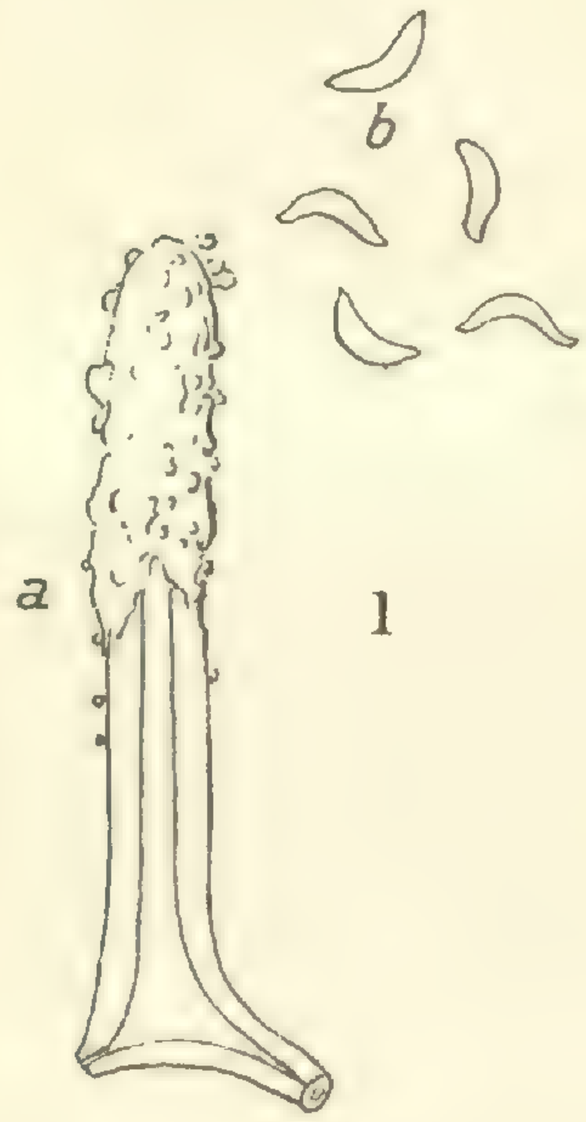
Plate II.

Fig. 5. *Corticium luteo-aurantiacum* n. sp. *a* Section of hymenium, showing basidia and cystidioles. *b* Spores.
Fig. 6. *Peniophora Cheesmanii*, n. sp. *a* Section of hymenium. *b* Spores.
Fig. 7. *Hymenochaete tasmanica*, Mass. *a* Section of hymenium. *b* One of the branched hyphae. *c* Seta.
Fig. 8. *Hymenochaete fuliginosa*, sensu Berk. *a* Section of hymenium. *b* Seta.
Fig. 9. *Stereum rhabarbarinum*, comb. nov. Section of hymenium.

XXXVI.—DAWYCK.

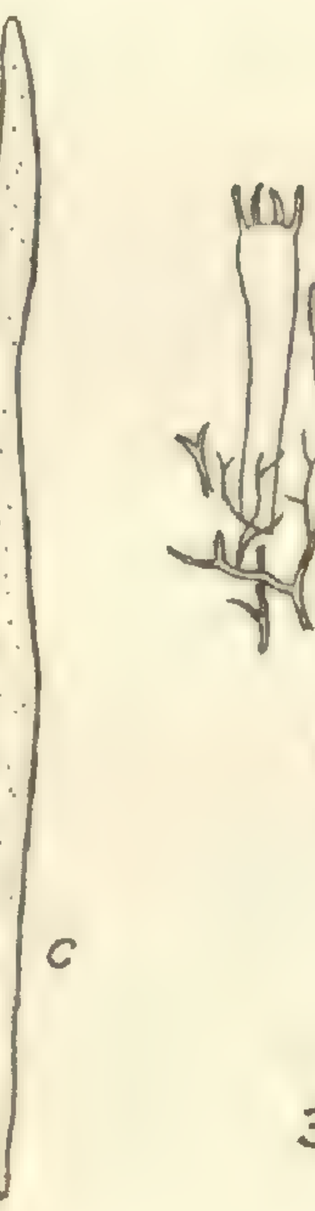
W. J. Bean.

This estate is situated in Tweeddale, a few miles from Peebles, amid romantic scenery, and varies in elevation from 500 to 2600 feet. Mr. F. R. S. Balfour, an enthusiastic arboriculturist and forester, who has travelled widely, especially in the great forest regions of Western North America, has introduced here a number of new and rare species. Dawyck as a garden and tree-planting centre has quite an interesting history. It belonged in ancient times to "a very considerable family of the name of Veitch." By 1715 it had come into the possession of Sir James Nasmyth who remade the garden and rebuilt the house so that, as we are told by Loudon, "from being a lonely mansion in the bosom of a gloomy mountain, it is now the extreme reverse." Two hundred years ago mountain scenery appears to have aroused emotions in the human mind very different to those we experience to-day. Traversing Mr. Balfour's plantations of larch and pine and fir on a bright day in May, the scene engirdled by the rounded hills of Tweeddale, one's feelings, even in these times, could scarcely be described as gloomy. Apart from its forestry, Dawyck is, indeed, a beautiful garden set in beautiful surroundings. The stonework near the house especially, so apt in old gardens to be redundant and obtrusive, is admirable in its restraint and in relation to its environment. Immediately behind the house are two large rectangular lawns on different levels and enclosed by low walls. Old Irish yews stand sentinel along the upper side. Beyond

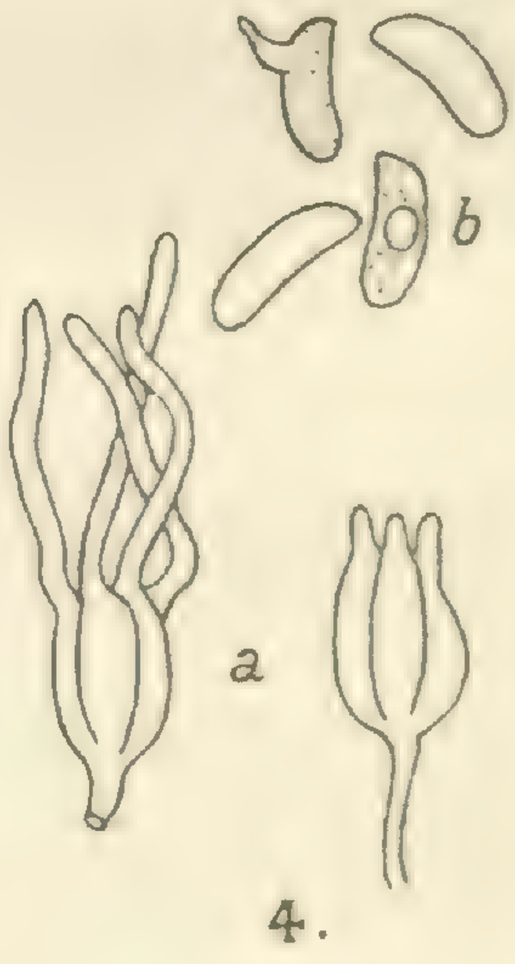


1

2.



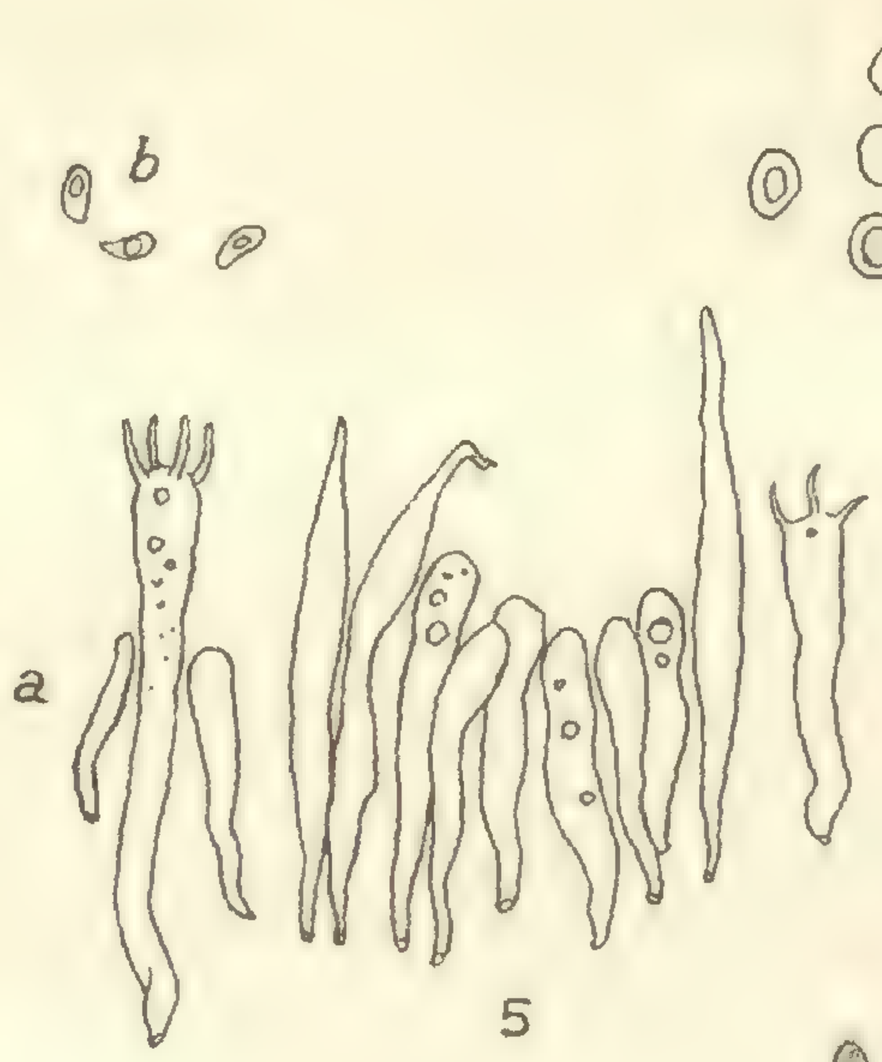
3.

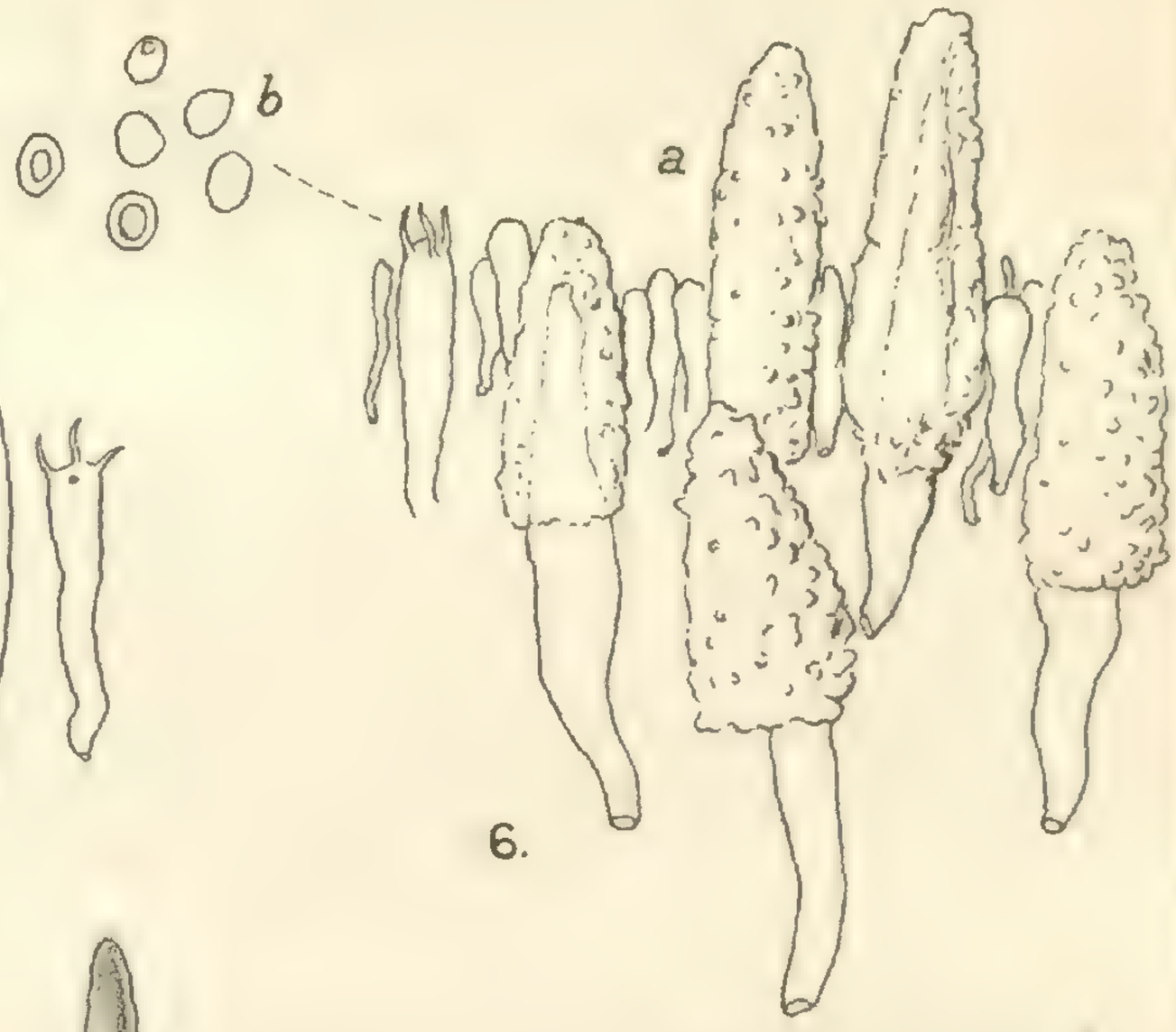


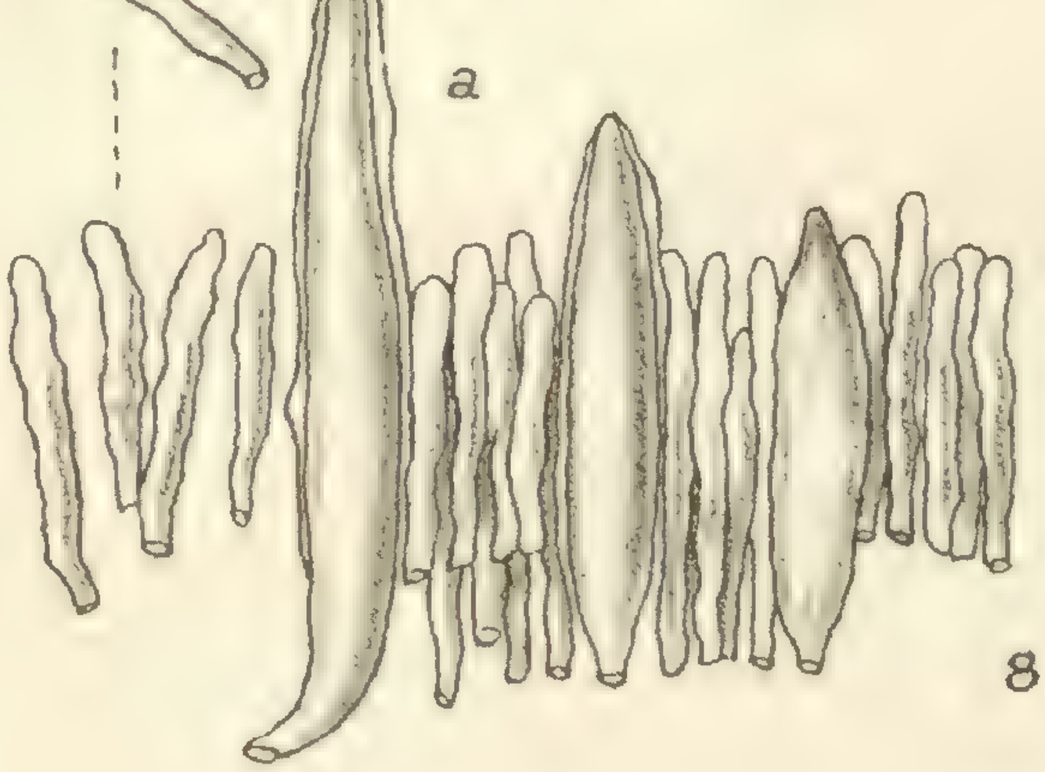
4.

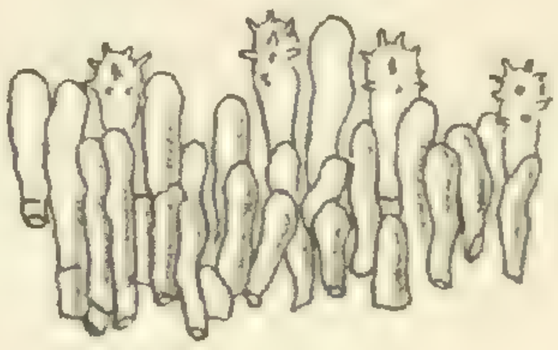
EMW.
4181. 153/601. 1150. 9. 15.

To face page 376.









EMW.

4161. 153/601. 1150. 9.15.

To face page 376.

the walls the grounds commence to rise rapidly, except where a steep-sided glen penetrates the hill—a small burn at its base hurrying to join the Tweed. Here, about sixty years or so ago, many trees were planted which have now become magnificent specimens.

There are some very fine examples of Douglas fir, and there is a perfect *Picea orientalis* with a trunk 5 ft. 9 in. in girth. *Tsuga Albertiana* (*Mertensiana*) also is a picture of health and grace. Of *Abies pectinata* there are the remains of an old avenue, the trunks of the individual trees measuring nearly 15 ft. in girth. There are also several notable specimens of *Abies nobilis*, *A. magnifica*, and *A. Nordmanniana*. Of the last the tallest is a very perfectly shaped tree growing near the "Sargent" garden which was 92 ft. high when measured a few years ago, and is now considerably taller. In some respects the most remarkable tree at Dawyck is a beech with erect-growing branches, now known as the "Dawyck Beech." It is at present the only fastigiate tree of common beech of which there is common knowledge, except some young ones raised from it. Over fifty years ago Petzold called a beech var. *pyramidalis*, but this appears to have been lost sight of. In any case Mr. Balfour's tree is truly fastigiate rather than pyramidal. It was named *Fagus sylvatica* var. *fastigiata* in *Gardeners' Chronicle*, March 9th, 1907, p. 149.

Although by name the balsam poplar (*Populus balsamifera*) is one of the best known of trees, the actual tree to which the name truly belongs is rarely to be found. Its place in gardens has been usurped by a closely allied poplar (*P. candicans*), distinguished by its pubescent young shoots. The real balsam poplar is a fine tree at Dawyck, where in May it filled the air around with the balsamic odour of its leaves and young shoots. Of common trees the most striking and numerous are the beeches, oaks—both pedunculate and sessile—and sycamores. The last especially, with rugged lichen-covered trunks, are very picturesque. Besides all these, Mr. Balfour has got together an extensive collection of exotic trees and shrubs of a newer generation. Of *Picea Breweriana*, that remarkable and beautiful weeping spruce from the Siskiyou Mountains of California, he has the best stock in Europe, and there are growing here many other rare trees and shrubs that he himself has imported from Western America, such as *Pachystima Myrsinites*, *Rhododendron albiflorum* (which has recently flowered at Dawyck), the yellow-fruited *Sambucus pubens*, *Cassiope Mertensiana*, the American form of *Linnæa borealis*, *etc.*

It appears to be an undecided question whether the first larches planted in Scotland were at Dawyck or at Dunkeld and Monzie. It is, however, claimed for Dawyck, on the authority of Sir Thomas Dick Lauder, that the first Scottish larches were planted there in 1725, whilst those at Dunkeld and Monzie were not planted until 1738. Of the nine original Dawyck larches, five still remain—rugged and battered veterans, but still in health. One of these figured by Loudon is among the survivors.

Many years ago someone at Dawyck planted large numbers of *Pinus Cembra*, a pine which has rarely been planted in any quantity. Many of the trees have been blown down in storms, but those that remain must, taken as a whole, be amongst the largest in the kingdom. One finely proportioned tree over 50 ft. high has a trunk girthing 5 ft. This pine appears to have little to recommend it for planting under forestry conditions in this country.

The lime avenues radiating north and east of the house were planted about 200 years ago and are still intact; but of the horse chestnuts of an even earlier date, few are left. The two mentioned by J. Walker in "Essays on Natural History," as being, when he wrote in 1812, 150 years old, and the first planted in Scotland, still remain, though a good deal decayed. Sir Walter Scott used to visit Dawyck and take pleasure in sitting under these trees.

Mr. Balfour is doing valuable work in covering the mountain sides of his estate up to 1000 and 1200 ft. with plantations of forest trees. Besides great stretches of common larch he has, for instance, sixty acres of Japanese larch (*Larix leptolepis*) and a large area of Douglas fir. But the most interesting part of his planting is where he is leaving the beaten track. He has, for example, a plantation of *Pinus monticola*, a comparatively rare and uncommon pine in this country and the West American representative of the Weymouth pine (*P. Strobus*). It is thriving extremely well, and Mr. Balfour thinks highly of it. Neither rabbits nor roe deer interfere with it, and its timber is known to be good. Extensive plantings of the new *Larix occidentalis* are also being made. There are some very thriving plantations of the Sitka Spruce (*Picea sitchensis*), and here as elsewhere in Scotland it promises to be one of the best of American trees. The Lawson and Nootka cypresses are succeeding well, but of *Thuya plicata* (syns. *Lobii* and *gigantea*), thousands have been destroyed in a young state by a parasitic fungus. Of broad-leaved species, Mr. Balfour is planting *Populus trichocarpa*, *Betula occidentalis* and *Alnus incana*, which grow very rapidly at Dawyck and give promise of becoming large trees.

In an admirably arranged and managed nursery of forest trees, Mr. Balfour has great numbers of the young conifers—mostly of *Abies* and *Picea*—introduced by Wilson during his last journey in the mountains of Western China. Sites on the hill-sides are already fixed on for these trees, and it is certain that their growth will be noted with the keenest interest by foresters throughout the country. In spite of the great number of timber-producing trees that have been introduced to this country from abroad, very few have proved to possess real economic value under forest conditions. Any one who can find a single species that will do for British forestry what the common larch, for instance, has done, will lay his country under a heavy debt of gratitude. Experimental planting, such as is being carried on by Mr. Balfour, is therefore a work of national importance.

XXXVII.—CEANOTHUS RIGIDUS.

T. A. Sprague.

Ceanothus rigidus was collected by Nuttall near Monterey, California, and his manuscript description was published in Torrey and Gray, Flora of North America, p. 268 (1838). It runs as follows: "Young branches pubescent; leaves opposite and crowded, cuneate-obovate, mostly retuse, thick and coriaceous, mucronately crenate-toothed, glabrous above, somewhat canescent beneath; umbels axillary and terminal, few-flowered, sessile; pedicels at length elongated; ovary with three protuberances. Bushy woods near Monterey, California.—March.—A shrub about 6 ft. high, rigid, intricately branched, almost spinose. Leaves about half an inch long, sometimes nearly obcordate; teeth conspicuous; the veins, &c., as in *C. verrucosus*. Clusters of flowers composed of several small crowded umbels; the pedicels gradually elongating to the length of 3-4 lines. Calyx and corolla bright blue."

C. rigidus was first introduced to cultivation in this country by Hartweg in 1848, though it had been collected by David Douglas and Thomas Coulter as far back as 1830–1833. Hartweg found it in open places in woods near Monterey in February, 1847,* and described it as an evergreen shrub, 4 ft. high, with azure flowers.† An amended description, based on plants grown in the Horticultural Society's garden, was published in 1850.‡

"A stiff branching dark evergreen bush; said to grow 4 ft. high when wild. Young branches downy. Leaves small, truncate, spiny-toothed, subsessile, very shining and smooth on the upper side; on the under pale and netted. This network is produced by numerous short branching veins, in the interspaces between which are deep pits, reaching half through the parenchyma, and each closed up by a dense ring of white converging hairs. Such pits are placed pretty generally in a double row between each of the principal lateral veins. The flowers appear in small clusters or umbels at the end of very short spurs. They are deep purplish violet, not blue, and less showy than those of *C. dentatus* or *C. papillosus*."

In 1852 *C. rigidus* was figured in the Botanical Magazine (t. 4664) from plants received from the Horticultural Society. The flowers were described as a rich purple-blue in colour.

The herbarium specimens of *C. rigidus* gathered by Hartweg, and the plants raised from seed collected by him and described in the Journal of the Horticultural Society and Botanical Magazine agree with Nuttall's type. The Botanical Magazine plant has rather more toothed leaves, but this is a very variable character.

---

* Journ. Hort. Soc. vol. iii. p. 218: "Two species of *Ceanothus*, the one producing numerous bundles of blue flowers from the axils of its small evergreen leaves.

† Benth. Pl. Hartweg, p. 302; and label in Herb. Kew.

‡ Journ. Hort. Soc. vol. v. p. 197.

considerable differences being found among the leaves on the same shoot.

Typical *C. rigidus* has small obovate-cuneate or suborbicular leaves, toothed in the upper half, small inflorescences with much abbreviated rhachis and short pedicels, and deep purple-blue flowers. It is now rare in cultivation in this country,* having been replaced by a form which may be known for horticultural purposes as var. *pallens*, though its botanical value is but slight. This has longer, more strictly cuneate, more conspicuously toothed leaves, larger inflorescences with longer rhachis and pedicels, and paler flowers. It appears to have been introduced for Messrs. Veitch by William Lobb, who collected in California during the period 1849–57. It is represented by two sheets in the Hookerian Herbarium, one marked "Hort. Veitch e California," the other "366 California, Lobb, 1857."

Ceanothus rigidus, var. **pallens,** *Sprague;* foliis longioribus, cuneatis, rhachi pedicellisque longioribus, floribus pallidioribus a typo recedit.

Folia cuneata, subtruncata vel emarginata, 0·8–2·5 cm. longa, 0·5–1 cm. lata, grosse dentata parte inferiore excepta. *Corymbi* 8–12-flori, ramulos abbreviatos bifoliatos terminantes; rhachis 6–7 mm. longa; pedicelli 1–1·5 cm. longi. *Flores* pallide violaceo-lilacini. *Calyx* 5–6 mm. diametro; lobi 2 mm. longi. *Corolla* 8 mm. diametro; petala 3 mm. longa. *Filamenta* 3–3·5 mm. longa. *Discus* sordide rubellus. *Stylus* in toto 2·5 mm. longus, ad medium trifidus; rami apice vix incrassati.

Though it may be convenient to distinguish the above form from the type, as it appears to be common in cultivation, it

* Specimens have been received from Miss E. Willmott, V.M.H., Warley Place.

nevertheless represents only one of a series of forms, which hardly admit of independent recognition, though the extremes are readily separable. *Brandegee* No. 93, from Monterey has leaves like those of var. *pallens*, but shorter pedicels, and *Elmer* No. 3535, from the same locality, resembles typical *C. rigidus*, but has almost entire leaves. Trelease* considers the plant figured in Bot. Mag. t. 4660 as a form of *C. rigidus*, and this form bridges over the gap between typical *rigidus* and var. *grandifolius*, which has a very distinct facies.

The illustration of *C. rigidus* given by Lindley and Paxton† resembles var. *pallens* rather than the type, which suggests that there may have been a considerable amount of variation in the plants of *C. rigidus* raised by the Horticultural Society from Hartweg's seed. T. A. S.

XXXVIII.—IBURU AND FUNDI, TWO CEREALS OF UPPER GUINEA.

(*Digitaria Iburua; D. exilis.*)

O. Stapf.

Iburu. In Dudgeon's "The Agricultural and Forest Products of British West Africa" (1911), p. 149, a cereal, called "Iboru," is mentioned as being grown in Northern Nigeria in the fields along with millet. It is also quoted in the Report on the Agricultural Department for 1912, Northern Nigeria, as a "cereal" (a small millet) receiving "a great deal of attention" at Zaria. No description is given nor is it referred to a definite species or genus of grasses. Quite recently, however, specimens of Iburu were received from Mr. Lamb with a note that the grass was sown in rows as a field crop in the Hausa States. The specimens had been obtained at Zaria, and were numbered 54. The grass belongs to the genus *Digitaria*, and resembles *D. exilis*, Stapf (*Paspalum exile*, Kippist) another small grained cereal of West Africa. Its botanical affinity is, however, with *D. ternata*, Stapf (*Panicum ternatum*, *Hochst.*), from which it can easily be distinguished by its crowded, closely imbricate spikelets, which are at the same time quite glabrous and slightly larger. From *D. exilis* it differs likewise in the packed arrangement of the spikelets and also in the angular, scabrid (not terete, smooth and disk-tipped) pedicels, and the short, very delicate upper glume. The grains of Iburu separate fairly readily from the surrounding husks when pressure is applied, and those of the sample received are pure white. They weigh in their husks on the average 0·7 mgr., so that over 40,000 go to one ounce. As one raceme may contain as many as 200 spikelets, a single head may yield between 1,000 and 2,000 grains.

As the grass has not been described so far, a full technical description is given herewith.

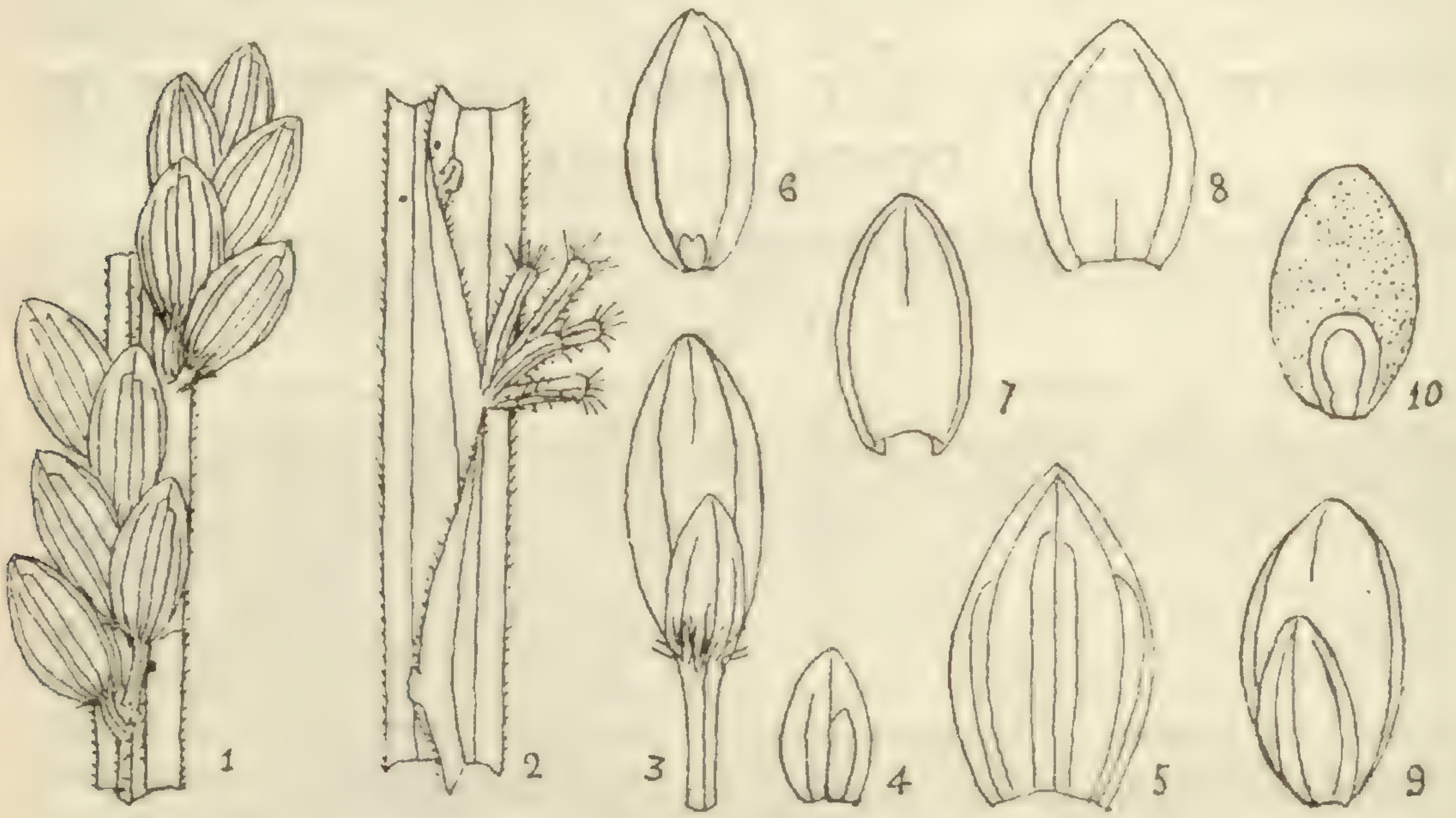
---

* A. Gray, Syn. Fl. N. Am. vol. i. part 1. p. 417.

† Paxton's Flower Garden, vol. i. p. 71. fig. 51.

Digitaria Iburua, *Stapf* [Gramineae-Paniceae]; affinis. *D. ternatae*, Stapf, sed spiculis majoribus glaberrimis densissime imbricatis distincta. A *D. exili*, Stapf, simili differt spiculis multo arctius aggregatis, pedicellis angulatis scaberulis apice haud in discum dilatatis, gluma superiore tenuiore multo breviore.

Annual, over 0·5 m. high. *Culms* glabrous, erect, simple, with 4–5 nodes; internodes enclosed in the sheaths, excepting the uppermost. *Leaf* sheaths tight, striate, glabrous, smooth, the lower keeled upwards; ligules membranous, rounded, broad, 2–3 mm. long; blades linear, rather broad at the base, long and finely attenuated upwards, up to 30 cm. long and 1 cm. wide, flat, with some long hairs near the base from behind the ligule, mid-rib slender, prominent above, primary side nerves about six on each side. *Racemes* subcomposite, 4–10, digitate, the lowest



D. Iburua. Fig. 1, part of raceme × 6; 2, part of rhachis spikelets removed × 8; 3, spikelet; 4, upper glume; 5, lower valve; 6, upper valve with valvule of lower floret in front; 7, upper valve, back view (the middle nerve is thinning out towards the base; it, as well as the side nerves are much less marked than shown in the drawing); 8, valvule; 9, fruiting spikelet; 10, seed. Figs. 3–10 × 10.

usually somewhat distant (1–2 cm.) from the remaining, which are closely crowded, suberect, 12–13 cm. long, slender, dense, pale green; rhachis triquetrous, slightly over 1 mm. wide, white, rounded and smooth on the back, angles green, narrowly winged scaberulous; branchlets finely filiform, adpressed to the rhachis, up to 5 mm. long, about 4 mm. distant, bearing up to five spikelets from near the base, angular, scaberulous, with short hairs or almost glabrous; pedicels similar, the lower very short, the upper up to 2·5 mm. long, tips minutely bearded, slightly thickened. *Spikelets* tightly imbricate, elliptic-lanceolate, subacute at the base, acute at the tips, 2 mm. long, pale green, quite glabrous, flat on the abaxial face. *Glumes* very delicate, hyaline, the lower quite minute or suppressed, the upper

ovate, obtuse, 0·75–1 mm. long, delicately three-nerved. *Valve* of lower (barren) floret thin, membranous, as long as the spikelet, sub-seven-nerved, the three inner nerves parallel, approximate and prominent, the lateral in pairs at the flexures, the outermost usually finer and shorter, the accompanying valvule almost microscopic, broad, emarginate-truncate; valve of upper (fertile) floret thinly papery, as long as that of the lower, smooth, obscurely nerved, embracing the very similar valvule with wide margins. *Stamens* 3; anthers 1 mm. long. *Stigmas* shortly exserted from near the apex. *Grain* ellipsoid, slightly compressed from the back, 1·5–1·75 mm. long, white, very finely pitted, tightly enclosed by the somewhat indurated brown husks; scutellum broad-elliptic, not quite reaching to the middle of the grain.

Nigeria. Hausa States, sown in rows as a field crop, Zaria, *Lamb* 54.

Fundi. This has for some time been known as a cultivated cereal in West Africa. It was first observed by Afzelius, who collected it in Sierra Leone in 1798, and on the label accompanying his specimen in the Smithian Herbarium at the Linnean Society observed that it was "much cultivated there by the negroes"; but he did not name it, and the plant remained unnoticed until in 1842 specimens were brought to this country by Mr. Robert Clarke, senior assistant surgeon to the Colony of Sierra Leone. From those Kippist described the grass as *Paspalum exile* in the Proceedings of the Linnean Society, vol. I. p. 157. Clarke's account of the cultivation and uses of the grass is interesting enough to be reprinted here in full.

"This Lilliputian grain, which is described by Mr. Clarke as being about the size of mignonette-seed, is stated to be cultivated in the village of Kissy and in the neighbourhood of Waterloo by industrious individuals of the Soosoo, Foulah, Bassa and Joloff nations, by whom it is called "hungry rice." The ground is cleared for its reception by burning down the copse-wood and hoeing between the roots and stumps. It is sown in the months of May and June, the ground being slightly opened, and again lightly drawn together over the seed with a hoe. In August, when it shoots up, it is carefully weeded. It ripens in September, growing to the height of about 18 in., and its stems, which are very slender, are then bent to the earth by the mere weight of the grain. They are reaped with hooked knives. The patch of land is then either suffered to lie fallow, or planted with yams or cassava in rotation. Manure is said to be unnecessary or even injurious, the plant delighting in light soils and being raised even in rocky situations, which are most frequent in and about Kissy. When cut down it is tied up in small sheaves and placed in a dry situation within the hut, for if allowed to remain on the ground or to become wet the grains become agglutinated to their coverings. The grain is trodden out with the feet, and is then parched or dried in the sun to allow of the more easy removal of the chaff in the process of pounding, which is performed in

wooden mortars. It is afterwards winnowed with a kind of cane fanner on mats.

In preparing this delicious grain for food, Mr. Clarke states that it is first thrown into boiling water, in which it is assiduously stirred for a few minutes. The water is then poured off and the natives add to it palm oil, butter or milk; but the Europeans and negroes connected with the colony stew it with fowl, fish or mutton, adding a small piece of salt pork for the sake of flavour, and the dish thus prepared is stated to resemble kous-kous. The grain is also made into a pudding with the usual condiments, and eaten either hot or cold with milk; the Scotch residents sometimes dressing it as milk-porridge. Mr. Clarke is of opinion that if the fundi grain were raised for exportation to Europe, it might prove a valuable addition to the list of light farinaceous articles of diet in use among the delicate or convalescent."

Subsequently it was noticed by Dr. A. Chevalier in "Une Mission au Senegal" (1900), 241. He identified it with *Paspalum longiflorum*, Retz, and gave "Fonio" as the native (Bambara) name. According to him it is cultivated almost all over the French Sudan, in Upper Gambia, Upper Casamance and Fouta-Djallon. The yield is small, but the taste so pleasant that even Europeans relish it. Pobéguin (Essai s.l. Flore de la Guinée Française, 1906, p. 215) also records it as cultivated all over French Guinea, and on the label of a specimen collected near Kouroussa (Upper Niger) he even calls it the principal food of the natives. Dr. Kersting observed it in cultivation in Togo-land. In 1904 Kew received specimens of it from the late Mr. W. R. Elliot from Northern Nigeria, with a note to the effect that the plant was cultivated at Loko, Nassarawa, and the seeds "eaten made into porridge." The native name given was "Acha." In 1911 it was sent in by Mr. C. C. Yates from the Niger Province, and last year by Mr. P. H. Lamb from Zaria, with the statement that "Acha" was sown broadcast as a field crop in the Hausa States. He has since informed us that it is even more largely cultivated by the Pagan tribes who inhabit the Bauchi Plateau at an altitude of 4000 ft., where the soil is, for the most part, poor and sandy.

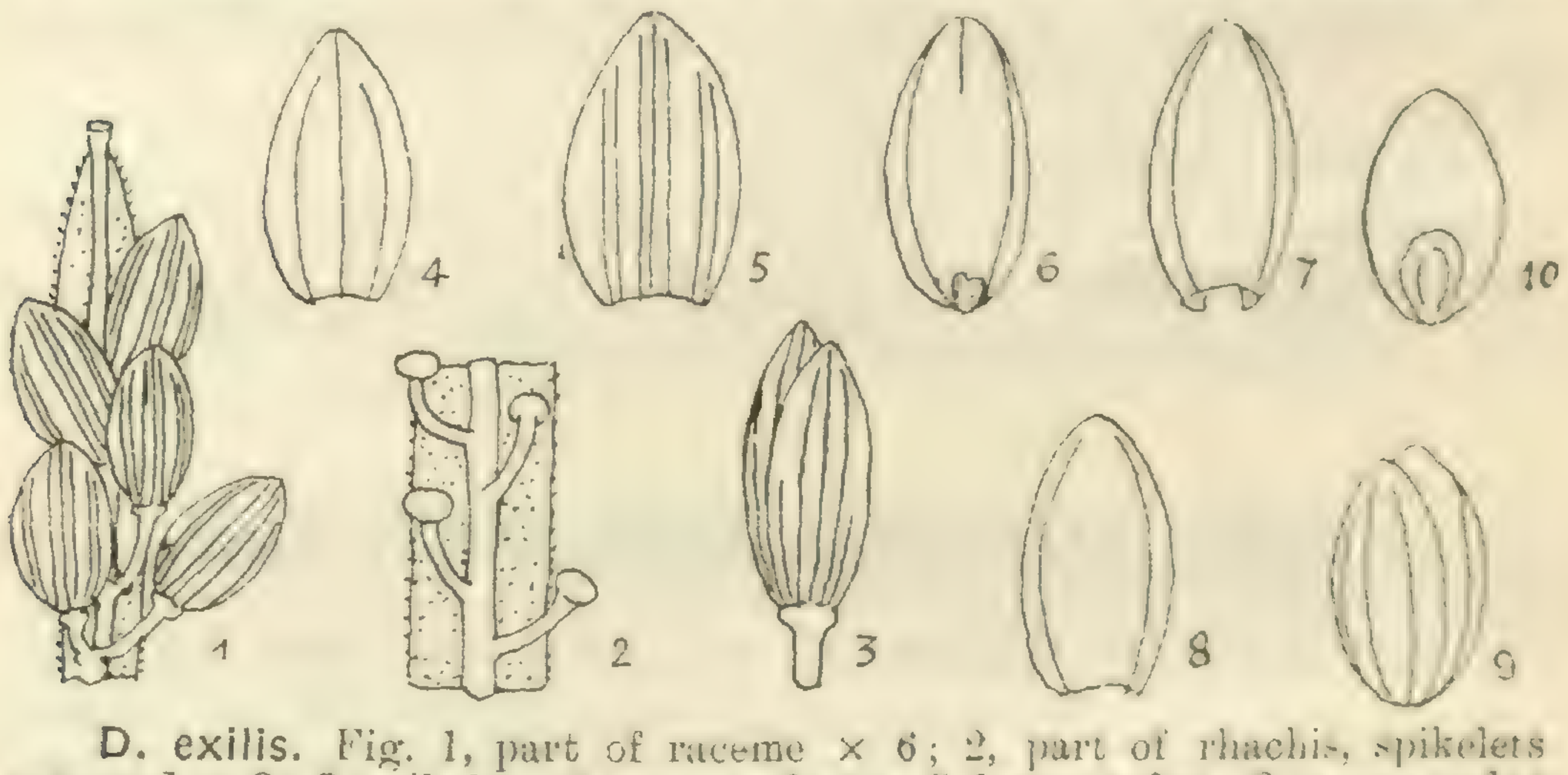
D. exilis approaches *D. longiflora*, Pers., very closely, and differs from it mainly in the perfectly glabrous and somewhat more turgid spikelets which, when mature, weigh on the average 0·53 mgr. (53,000 grains to the ounce). Well-developed racemes may contain up to and even over 200 spikelets, and there are usually 2–4 racemes to the head, so that one head may yield some 600 grains, which is well below the yield of Iburu. The very much more general use of Fundi, as compared with Iburu, suggests some advantages in favour of the former which are, however, not apparent from the meagre material at hand. The close resemblance between *D. exilis* and *D. longiflora* points to *D. longiflora* as the ancestral wild form of *D. exilis*, but more extended investigation is necessary before this hypothesis can be accepted as proved. *D. longiflora* is widely distributed throughout the tropics of the Old World, but is apparently rare in Upper

Guinea. *D. exilis*, on the other hand, is only known in the cultivated state from the area indicated above.

The following is a description of "Fundi."

Digitaria exilis, *Stapf.*

Annual, over 0·5 m. high. *Culms* glabrous, erect or geniculate-ascending, simple or sparingly branched from below, with 5–8 nodes, nodes constricted, mostly shortly exserted from the sheaths, uppermost internode long exserted. *Leaf* sheaths tight, or the lower and intermediate somewhat loose and slipping off the internodes, striate, glabrous, smooth, the lower more or less keeled; ligules membranous, rounded, broad, up to 2 mm. long; blades linear, gradually attenuated to an acute point, 0·5–1·5 cm. by 3–7 mm.: flat, glabrous, midrib slender, primary side nerves 3–4 on each side. Racemes 2–4, digitate, sessile or subsessile, or



D. exilis. Fig. 1, part of raceme × 6; 2, part of rhachis, spikelets removed × 8; 3, spikelet; 4, upper glume; 5, lower valve; 6, upper valve with valvule of lower floret in front (the middle nerve should have been shown thinning out towards the base); 7, upper valve, back view (the side nerves are too much emphasized, and the middle nerve is omitted); 8, valvule; 9, fruiting spikelet; 10, seed. Figs. 3–10 × 10.

the terminal shortly peduncled, 5–12 (rarely 14) cm. long, slender, pale green in flower; rhachis flat, 0·5 to almost 1 mm. wide, green, margins scabrid, midrib rather stout, whitish, very slightly convex and smooth on the back, more or less raised, rounded and almost smooth, or very sparingly and minutely pubescent on the face; pedicels paired or (upwards always) solitary or, towards the base, approximate in groups of 3 or 4, flexuous, terete, with the tips discoid, from less than 0·5 to 1 mm. long, whitish, smooth, or sometimes very sparingly and minutely asperulous or pubescent. *Spikelets* subimbricate when in flower, elliptic-oblong in outline, acute, 1·75–2 mm. long, pale green, quite glabrous, flat on the abaxial face. *Glumes* very different; the lower delicately hyaline, nerveless, very minute or almost suppressed, the upper broad-oblong, obtuse or subobtuse, hyaline between the 3–5 percurrent green nerves, slightly shorter than the spikelet. *Valve* of lower (barren) floret elliptic, subobtuse, as long as the spikelet, thin, hyaline between the seven raised percurrent green nerves, which are parallel and equally distant, or more often the three

inner and the two outer on each side slightly more approximate, usually all connected by transverse bars close below the hyaline tips; accompanying valvule almost microscopic, square, papillose; valve of upper (fertile) floret thinly papery, equalling the spikelet, acute, embracing the very similar valvule almost entirely, shining, faintly 5–nerved. *Stamens* 3. *Stigmas* dark purple, shortly exserted from near the tip of the spikelet. *Grain* oblong-ellipsoid, slightly flattened on the back, 1 mm. long, white, smooth and shining, tightly enclosed by the slightly indurated brown husks; scutellum ovate-elliptic, not quite reaching to the middle of the grain. *Digitaria longiflora*, Mission au Senegal, 241, non Retz. *Paspalum exile*, Kippist in Proceed. Linn. Soc. i. 157, 16.

Sierra Leone. Without precise locality, *Afzelius*, *R. Clarke*, *Schön*.

French Guinea. San, *Chevalier* 2217; Koroussou, *Pobéguin* 490.

Togoland. Difalu, *Kersting*.

Nigeria. Nassarawa. *Elliot* 195: Zaria, *Lamb* 53; Niger Province, *Yates* 29.

XXXIX.—DIAGNOSES AFRICANAE: LXIV.

1551. **Passerina Galpini,** *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 10, anglice [Thymelaeaceae-Euthymelaeeae]; affinis *P. filiformi*, Linn., foliis subcylindricis, bracteis transverse oblongis calyceque glabro differt.

Rami breves, glabri. *Folia* conferta, subcylindrica, leviter incurvata, 6 mm. longa, 1 mm. diametro, glabra, nitida. *Flores* ad ramorum apices aggregati; bracteae transverse oblongae, 5 mm. latae, scariosae, basi intus lanatae, apice in lobum crassum subulatum obtusum 2 mm. longum producto; bracteolae 0. *Calyx* glaber; tubus anguste ovoideus, 3 mm. longus, 1 mm. diametro parte inferiore; lobi 3 mm. longi, 2 mm. lati, ovati, concavi, obtusi. *Stamina* longiora 3 mm. longa; antherae obtuse cordatae, 1 mm. longae. *Ovarium* oblongum, glabrum; stylus calycis tubo paullo longior; stigma penicillatum.

South Africa. Riversdale Div.; Milkfontein, 183 m., *Galpin* 4491.

1552. **Passerina laniflora,** *C. H. Wright* in Dyer, Fl. Cap. vol. 5, sect. 2, p. 11, anglice [Thymelaeaceae-Euthymelaeeae]; *P. paleaceae*, Wikstr., calyce lanato differt.

Planta lignosa; rami plures, breves, apice pilosi. *Folia* stricte quadrifaria, oblonga, paullo incurvata, obtusa, glabra, 4 mm. longa, 0·5 mm. lata. *Flores* ad ramorum apices aggregati; bracteae ovatae, 3 mm. longae; bracteolae 2, crasse triquetrae, 3 mm. longae. *Calyx* dense lanatus; tubus subcylindricus,

3 mm. longus; lobi 4, late ovati, obtusi, 3 mm. longi, 2 mm. lati. *Filamenta* tenuia, longiora 1·5 mm. longa; appendices cylindricae, 0·5 mm. longae. *Ovarium* ovoideum; stylus filiformis, 4 mm. longus; stigma penicillatum.

South Africa. Clanwilliam Div.; Cederberg Range, Sneeuw Kop, 1376 m., *Bodkin in Herb. Bolus*. 9086.

1553. **Passerina rubra,** *C. H. Wright* in Dyer. Fl. Cap. vol. v. sect. 2, p. 12, anglice [Thymelaeaceae-Euthymelaeeae]; *P. ericoidei*, Linn., affinis, foliis internodiis brevioribus spicisque elongatis differt.

Rami virgati, graciles, primum pubescentes, demum glabri; internodia foliis paullo longiora. *Folia* oblonga, triquetra, obtusa, glabra, 3 mm. longa, 0·7 mm. lata. *Flores* prope ramorum apices congesti; bracteae ovatae, intus dense sericeae, extus crasse 5–vel 7–costatae; bracteolae 0. *Calycis* tubus ovoideus, 3 mm. longus; lobi elliptici, concavi, obtusi, subscariosi, 2·7 mm. longi, 1·3 mm. lati. *Stamina* 8. longiora 3 mm. longa. *Ovarium* ovoideum, glabrum; stylus filiformis; stigma penicillatum.

South Africa. Riversdale Div.; Muiskraal. near Garcias Pass, 370 m., *Galpin* 4492; Albany Div.; mountains near Howison's Poort, 611 m., *MacOwan* 103.

1554. **Cryptadenia laxa,** *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 17, anglice [Thymelaeaceae-Euthymelaeeae]; affinis *C. uniflorae*, Meisn., foliis ovato-lanceolatis ramisque primum puberulis differt.

Planta 30 cm. alta vel brevior, basi ramosa; rami graciles, rigidi, primum puberuli, demum glabri; internodia foliis aequilonga. *Folia* opposita, ovato-lanceolata, acuta, 8 mm. longa. usque ad 2 mm. lata, concava, dorso levia vel supra leviter carinata, glabra. *Flores* solitarii, terminales. *Calyx* extus sericeus; tubus cylindricus, tenuis, 4-6 mm. longus; lobi ovati. 6 mm. longi, 2·5 mm. lati, subacuti. *Stamina* longiora ad medium loborum calycis attingentia; antherae oblongae, 1 mm. longae; laciniae ad basin filamentorum liberorum oblongae, tenues, 0·5 mm. longae. *Ovarium* oblongum, glabrum; stylus lateralis, filiformis, supra incrassatus pilosusque: stigma breviter clavatum.

South Africa. Caledon Div.: Zwart Berg, near Caledon, 978 m., *Bolus* 7875; near Houw Hoek, 611 m., *Bolus* 9208; Bredasdorp Div.; Elim. *Bolus* 7876; and without precise locality, *Harvey*.

1555. **Struthiola epacridioides,** *C. H. Wright* in Dyer. Fl. Cap. vol. v. sect. 2, p. 29 [Thymelaeaceae-Euthymelaeeae]; affinis *S. ovatae*, Thunb., foliis patentibus floribusque in axillis fere foliorum omnium dispositis differt.

Rami longi, primum pilosi, demum glabri. *Folia* patentia, lanceolata, plana, acuminata, 1·2 cm. longa, 3 mm. lata, marginibus ciliatis. *Flores* axillares; bracteolae fere 4 mm. longae,

subulatae, leviter recurvatae, ciliatae. *Calycis* tubus subrectus, glaber, 1·4 cm. longus, 0·7 mm. diametro; lobi ovati, obtusi, 2 mm. longi, 1·5 mm. lati. *Petala* 8, 1·5 mm. longa, pilis aequilongis circumdatis instructa. *Ovarium* oblongum, glabrum; stylus filiformis; stigma penicillatum.

South Africa. Without precise locality, *Mund* 19.

In *S. ovata*, Thunb., the flowers are confined to the axils of the upper leaves; in *S. epacridioides* they are situated in the axils of nearly all the leaves of the branches, thus giving the two plants quite different facies.

1556. **Struthiola Macowani,** *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 29 [Thymelaeaceae-Euthymelaeeae]; affinis *S. oratae*, Thunb., foliis ellipticis angustioribus calyceque longiore differt.

Caulis erectus, subrobustus, sparse ramosus; rami primum leviter pubescentes. *Folia* opposita, imbricata, elliptica, acuta, minute scaberula, 0·8–1 cm. longa, 3 mm. lata. *Flores* in axillis foliorum plurium dispositi; bracteolae oblongae, obtusae, ciliatae, 4 mm. longae. *Calyx* glaber; tubus subcylindricus, leviter curvatus, 1·6 cm. longus; lobi subrotundati, obtusi, 2 mm. longi. *Petala* 8, oblonga, crassa 1·2 mm. longa, pilis aequilongis circumdatis instructa. *Antherae* connectivo obtuso supra producto instructae. *Ovarium* oblongum, glabrum; stylus filiformis, 1·2 cm. longus; stigma penicillatum.

South Africa. Humansdorp Div.; Kruisfontein Mountains, 275 m., *Galpin* 4505, Albany Div.; near Grahamstown, *MacOwan* 14; Howisons Poort, *Schönland*.

1557. **Struthiola pondoensis,** *Gilg* ex *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 31, anglice [Thymelaeaceae-Euthymelaeeae]; affinis *S. hirsutae*. Wikstr., foliis ovato-lanceolatis subtus glabris differt.

Caulis ramosus; rami primum pilosi, deinde glabrescentes, demum cicatricibus foliorum delapsorum scabri. *Folia* ovato-lanceolata, acuta, basi leviter contracta, subtus glabra, marginibus ciliatis, 8 mm. longa, 3 mm. lata. *Flores* in axillis foliorum superiorum dispositi; bracteolae 2, lanceolatae, concavae, dense ciliatae, 3 mm. longae, 1 mm. latae. *Calyx* glaber; tubus cylindricus, gracilis, 9 mm. longus; lobi deltoidei, acuti, 2 mm. longi, 1·5 mm. lati. *Petala* 8, calycis lobis dimidio breviora, crassa, pilis paullo brevioribus circumdata. *Antherae* oblongae, obtusae, 1·5 mm. longae. *Ovarium* oblongum, compressum, glabrum: stylus filiformis; stigma penicillatum.

South Africa. Pondoland; without precise locality, *Bachmann* 719.

1558. **Struthiola congesta,** *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 31, anglice [Thymelaeaceae-Euthymelaeeae]; affinis *S. hirsutae*, Wikstr., foliis omnino glabris minutissime denticulatis differt.

Frutex multiramosum; rami subgraciles, demum cicatricibus foliorum delapsorum scabri. *Folia* elliptica, obtusa vel subacuta,

glabra, minutissime denticulata, 8 mm. longa, 2 mm. lata. *Flores* in axillis foliorum supremorum dispositi: bracteolae 2·5 mm. longae, induplicatae, marginibus latis membranaceis ciliatis et fasciculo terminali pilorum instructae. *Calyx* glaber; tubus 8 mm. longus, 0·7 mm. diametro; lobi ovati, obtusi, 2·5 mm. longi, 2 mm. lati. *Petala* 8, crassa, 1 mm. longa, pilis paucis dimidio brevioribus circumdata. *Antherae* connectivo brevi truncato fusco coronatae. *Ovarium* oblongum, glabrum; stylus filiformis, 6 mm. longus; stigma penicillatum.

South Africa. Pondoland; in a damp valley near Murchison, *Wood* 3030.

1559. **Struthiola cicatricosa,** *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 32, anglice [Thymelaeaceae-Euthymelaeae]: affinis *S. linearilobae*, Meisn., ramis primum pilosis, foliis fasciculo terminali pilorum instructis differt.

Fruticulus erectus, multiramosus; rami graciles, primum pilosi, demum cicatricibus foliorum delapsorum scabri. *Folia* opposita, subulata, acuta, fasciculo terminali pilorum instructa, 6 mm. longa, 0·5 mm. lata. *Flores* in axillis foliorum superiorum dispositi; bracteolae 4 mm. longae, oblongae, ciliatae, fasciculo terminali pilorum instructae. *Calyx* glaber; tubus gracilis, glaber, 1·4 cm. longus; lobi oblongi, acuti, apice penicillati, 3 mm. longi, 0·7 mm. lati. *Petala* 8, oblonga, 1 mm. longa, pilis aequilongis circumdata. *Antherae* connectivo acuto terminatae. *Ovarium* oblongum, glabrum; stylus filiformis; stigma parvum.

South Africa. Without precise locality, *Thom* 577.

1560. **Struthiola longifolia,** *C. H. Wright* in Dyer, Fl. Cap. vol. v. sect. 2, p. 33, anglice [Thymelaeaceae-Euthymelaeae]; affinis *S. erectae*, Linn., foliis oblongis duplo longioribus differt.

Rami erecti, virgati, quadrangulares, glabri, cicatricibus prominentibus foliorum delapsorum vestiti. *Folia* oblonga, acuta, glabra, 1·2–1·4 cm. longa, 1 mm. lata. *Flores* in axillis foliorum plurium dispositi; bracteolae oblongae, obtusae, carinatae, glabrae, 5 mm. longae, marginibus membranaceis. *Calyx* glaber; tubus parte inferiore cylindricus, parte superiore inflatus, 1·2 cm. longus; lobi ovati, acuti, apice incrassati, 3 mm. longi, 2 mm. lati. *Petala* 8. *Antherae* connectivo acuto coronatae. *Ovarium* oblongum; stylus filiformis, 1 cm. longus; stigma penicillatum.

South Africa. Caledon Div.: Zoetemelks Valley, *Burchell* 7578.

XL.—MISCELLANEOUS NOTES.

David Thomas Gwynne-Vaughan.—After some weeks of illness, Professor D. T. Gwynne-Vaughan died at Reading on September 4th. His death is deeply regretted by his numerous friends and botanical associates, and to many of them it was entirely unexpected.

Gwynne-Vaughan had held the Professorship of Botany at University College, Reading, for just a year since leaving Belfast, where he was Professor of Botany at Queen's University. Before his appointment to Belfast a few years ago, he was Lecturer in Botany at the Birkbeck College, and before that in the University of Glasgow, where he was on the Botanical Staff from 1897 to 1907.

Some of his earliest research work was carried out at Kew in the Jodrell Laboratory, and led to the publication in 1896 and 1897 of papers on the morphology and anatomy of the *Nymphacaceae*, and on "Polystely in the Genus *Primula*." In both cases vascular anatomy was specially dealt with, and the direction of his later work was thus indicated, his energies being afterwards chiefly devoted to a study of the vascular anatomy of Ferns. While still working at Kew he was attracted by this subject, and since then his interest in Ferns and Vascular Cryptogams in general has never flagged.

The result of his investigations is seen in a number of important contributions, *e.g.*, those on the anatomy of *Loxsoma* and of other Ferns with solenostelic structure, and a series of papers published in collaboration with Mr. R. Kidston, F.R.S., on Fossil *Osmundaceae*. These, like the rest of Gwynne-Vaughan's published works, are the outcome of careful observation and keen judgment, and their value is widely known as having contributed a large part of the advance made in recent years in our knowledge of the vascular tissues of Ferns.

Gwynne-Vaughan naturally took a great interest in the collection of Ferns at Kew, so that for him a tour of the Fern Houses formed an essential part of a visit to the Gardens, and he regretted that his visits to Kew were perforce rather rare.

Frederick W. Harvey.—We regret to record the death of Mr. F. W. Harvey, a former member of the gardening staff of the Royal Botanic Gardens, and for the last five years Editor of *The Garden*. He came to Kew in April, 1903, from the Essex County Council Gardens at Chelmsford, and after undergoing the general routine of a young gardener's life here, left in July, 1905, to take up a position on the Editorial Staff of *The Gardener*. In 1907 he was appointed Sub-Editor of *The Garden* and became Editor of that Journal in 1910. In the latter position he was responsible for the horticultural matter in *Country Life*, and added to the Country Life Library a book on *Fruit Growing for Beginners*, and a new and enlarged edition of *Gardening for Beginners*. He took an active interest in various horticultural matters and was a prominent member of various horticultural societies. He was also a member of the Executive Committee of the Kew Guild, and always keenly interested himself in all matters concerning the welfare of the Guild. Until the middle of August he appeared to be in normal health; after a few days' illness, however, circumstances arose which necessitated a serious operation and he died a week later on August 31st.

Cistanche lutea.—Reference was made to Tournefort's Phelipae Lusitanica, flore luteo (*Cistanche luteo*, Hoffmigg. and Link), in the article "The Genus Phelipaea." *K.B.* No. 6, p. 286, and it was stated that "a drawing and a carbon impression of it marked 'D. Tourn. e Portugalia D. Sherard' is in Morison's Herbarium, and that a description was published by Bobart in Morison's Plantarum Historia, vol. iii. (1699), p. 502." To this was added the remark "whether Tournefort had it from Grisley, or collected it himself when in Portugal in 1688, as is most likely, is uncertain." Professor Henriques, of Coimbra, has since been so kind as to call our attention to his paper "Exploraçao Botanica em Portugal par Tournefort" (in Bol. Soc. Brot. vol. viii. pp. 191–261), which contains an enumeration by Tournefort of the plants he collected in Portugal in 1689. From the list it is evident that Tournefort collected this *Cistanche* between Villa Nova de Portimâo and Lagos in the Province of Algarve in 1689. The entry (p. 221) runs "Orobanche palustris maximo digitalis flore luteo. Orobanche elegantissima verna flore luteo Grisley." On p. 257, Prof. Henriques identifies this plant with "Phelypaea Lusit. flore luteo, Corol. 47—P. lusitanica, Tournef." Tournefort travelled twice in the Iberian Peninsula, and it was during his second journey that he visited Portugal. He started in October, 1688, but did not reach Portugal until the following year.

O. S.

Botanical Magazine for September.—The plants figured are *Populus lasiocarpa*, Oliver (t. 8625); *Gladiolus Melleri*, Baker (t. 8626); *Ornithoboea Lacei*, Craib (t. 8627) and *Metrosideros diffusa*, Smith (t. 8628).

The Poplar is without doubt the finest species of the genus with its leaves measuring as much as 14 inches long by 9 inches wide, and having midrib, veins and petiole a rich red. Like its closest ally *P. glauca*, Haines, the flowers are polygamous, and the catkins are from 4–6 inches in length. *P. lasiocarpa* was first collected by Mr. A. Henry in Hupeh, and was introduced to cultivation by Messrs. Veitch & Sons, who received a living plant from Mr. E. H. Wilson. The specimens figured came from the gardens of Mr. F. C. Stern and Sir Harry Veitch, where the tree flowered in 1914.

Gladiolus Mellcri was discovered in 1861 by Mr. C. J. Meller in Nyasaland during Dr. Livingstone's Zambesi expedition. The plant figured was sent to Kew in 1913 by Mr. A. Hislop from Rusape, Rhodesia. Its nearest ally, *G. Buchanani*, Baker, also from Nyasaland, differs especially in having several well-developed leaves instead of the single elongated leaf characteristic of *G. Melleri*, and in *G. Melleri* the stamens are shorter than the upper perianth segments.

The genus *Ornithoboea* now contains at least six species, all natives of the Indo-Chinese region. Three of these have now flowered under cultivation, the one under notice having been raised at Kew from seed collected by Mr. J. H. Lace in Upper

Burma, the other two being from seeds sent by Dr. Kerr from Siam to Trinity College, Dublin. *Ornithoboea* resembles *Boea* and *Streptocarpus* in its twisted fruits, but it is distinguished from both by its bilabiate corolla with the short upper lip.

Metrosideros diffusa, a native of New Zealand, is a very striking species with its crimson flowers and conspicuous stamens. Its nearest ally is *M. albiflora*, Sol. from which it is easily distinguished by its much smaller leaves and crimson flowers. *M. diffusa* is confined to the North Island and was introduced to cultivation by Captain A. A. Dorrien Smith. It flowered for the first time in the gardens at Tresco Abbey, Isles of Scilly, in April, 1914.

W. H. Fitch.—The publication named below was accidentally omitted from the "Serials and Periodicals" (*see* p. 284) containing drawings by W. H. Fitch. Adding these to the approximate number of published plates of his work brings the total up to 9960.

Refugium Botanicum (W. W. Saunders), 5 vols., 1869–1880. Three hundred and sixty partly coloured plates.

W. B. H.

Dominica Botanic Gardens.—We regret to learn, through a letter from Mr. J. Jones, the Curator, that the Island of Dominica was visited by a very heavy gale on the night of August 10th, which caused a great deal of damage in the Botanic Gardens and also in other places. About 100 trees, some of large size, were uprooted, and many others lost their tops or some portion of their branches. Unfortunately a number of species of which there was only a single specimen have been destroyed.

Mr. Jones writes that it will be a long time before the grounds can be put in proper order; but a generation at least must elapse before the gardens can be fully restored to their condition before the gale. The photographs accompanying the letter are sad records of the devastation which has been caused.

Mr. Jones adds that the cacao and lime experiment plots, which lie in situations better protected than the Botanic Gardens, are not seriously damaged, although there is some loss of trees. Some of the lime estates in the Island exposed to the south-west have, however, suffered severely. Not only has there been a great loss of crop, but a large number of trees have been uprooted.

[*Crown Copyright Reserved.*

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 9] [1915

XLI.—SOME NEW SPECIES FROM BURMA.

J. H. LACE.

During the last five years a considerable number of new species of plants from Burma have been described and published in the *Kew Bulletin* or in the Records of the Botanical Survey of India, the majority of which were found in Maymyo and its neighbourhood or in the Southern Shan States, whilst others came chiefly from the hill regions of the Ruby Mines and Bhamo Districts. Although shrubs, climbers and herbaceous plants predominate amongst the new species, many trees, some of great size, are also included, for instance, *Manglietia Hookeri*, Cubitt & Smith, *Elaeocarpus Robertsonii*, Gamble, *Paramephelium hystrix*, W. W. Smith, *Meliosma Mannii*, Lace, *Dalbergia maymyensis*, Craib,, *Acacia Myaingii*, Lace, *Pyrus kachinensis*, W. W. Smith, *Lagerstroemia Collettii*, Craib, *Homalium bhamoense*, Cubitt & Smith, *Adina indivisa*, Lace, *Diospyros glandulosa*, Lace, *Styrax Lacei*, W. W. Smith, *Stereospermum grandiflorum*, Cubitt & Smith, *Beilschmedia Robertsonii*, Gamble, all from Upper Burma, while from Lower Burma may be mentioned *Rhus amherstensis*, W. W. Smith, *Millettia utilis*, Dunn, *Cordia globifera*, W. W. Smith and *Wightia Lacei*, Craib. In the same period other additions have been made to the flora of Burma by the collection of species previously recorded only from neighbouring countries, *e.g.*, *Miliusa Thorelii*, Finet & Gagnep., *Sterculia Principis*, Gagnep., *Chailletia gelonioides*, Hook. f.. *Celastrus Hookeri*, Prain, *Acer oblongum*, Wall., *Meliosma Thomsonii*, King ex Brandis, *Dracontomelum mangiferum*, Bl., *Mucuna sempervirens*, Hemsl., *Pueraria alopecuroides*, Craib, *Dalbergia Kerrii*, Craib, *Saraca cauliflora*, Baker, *Rubus lucens*, Focke, *Rubus yunanicus*, Kuntze, *Rosa sericea*, Lindl., Distylium *indicum*, Benth., *Viburnum erubescens*, Wall., *Viburnum inopinatum*, Craib, *Hymenodictyon flaccidum*, Wall., *Gardenia sootepensis*, Hutch., *Rhododendron indicum*, Sweet, *R. microphytum*, Franch., *R. oxyphyllum*, Franch., *Styrax grandiflorum*, Griff., *S. Veitchiorum*, Franch., *Fraxinus Griffithii*, Clarke, *Strychnos Thorelii*, Pierre, *Endiandra firma*, Nees, *Cleistanthus chartaceus*, Muell.-Arg., *Glochidion Kerrii*, Craib, *Sauropus*

(4108.) Wt. 153—601. 1,125. 11/15. J. T. & S. G. 14.

bicolor, Craib, *Antidesma sootepensis*, Craib, *Macaranga triloba*, Muell.-Arg., *Macaranga indica*, Wight, *Quercus Junghuhnii*, Miq., *Quercus Rex*, Hemsl.

The above tends to show that our knowledge of the flora of Burma is by no means complete, even in the case of trees; and, taking into consideration the fact that most of the recent collectors were officers of the Forest Department who naturally pay most attention to woody species, often to the entire exclusion of herbaceous plants without economic value, it appears safe to infer that there is still much to be done in the botanical exploration of the country, especially in Upper Burma and more particularly in those regions whose elevation exceeds 3000 ft. above sea level.

Amongst the species described below, the majority of which were found at Maymyo, perhaps the most interesting is *Allospondias laxiflora*, a large deciduous tree on the small limestone hills near the lower reaches of the Salween river and its tributaries, about which doubt has existed since flowering specimens of it were first collected by Brandis in 1862; this was originally named *Buchanania laxiflora*, Kurz, but M. Pierre pointed out that it was not a *Buchanania* and was probably a new genus, a fact admitted in Indian Trees, p. 206; there is no leaf on the sheet of the specimen collected by Brandis which is in the Kew Herbarium, and it is not known what leaf (simple) was described by Kurz under *Buchanania laxiflora* in his Flora of British Burma.

With regard to the local flora of Maymyo, of which I was able to make a fairly complete collection, any general description would at present be out of place and is reserved for some future occasion. I gladly take this opportunity, however, of acknowledging with many thanks the kindness of Sir David Prain, Director of the Royal Botanic Gardens, in permitting the work of naming my collections from Burma to be done in the Kew Herbarium, and the assistance afforded me by members of the Staff. To Mr. W. G. Craib, lately Assistant for India in the Herbarium, I am especially indebted both for the keen interest he has taken in my collections and for his valuable help and sound criticisms.

Clematis burmanica, *Lace* [Ranunculaceae–Clematideae]; a *C. Craibiana*, Lace, cui valde affinis, nervatione, indumento, filamentis multo longioribus, antheris conspicue minoribus, stigmato clavato inter alia differt.

Frutex scandens; rami graciles, teretes, sulcati, purpureo-brunnei, pruinosi, juventute pilis brevibus pallide luteis nitidis adpressis puberuli. *Folia* pinnatim 3–foliata; petiolus 8–10 cm. longus, parum costatus ut ramuli puberulus; foliola late ovata, apicem acutum versus gradatim angustata, basi rotundata, plerumque anguste cordata, interdum truncata vel ramulorum apices versus cuneata, usque ad 10·5 cm. longa et 5·5 cm. lata, terminali quam lateralibus parum majore, chartacea, juventute pilis brevibus pallide luteis adpressis praecipue ad nervos sparse tecta, mox pagina utraque fere glabra, inferiore pallidiore glaucescente, e basi vel fere e basi 7-nervia, nervis gracilibus supra magis minusve impressis subtus prominentibus, nervulis fusco-brunneis reticulationem gracilem formantibus, margine integra;

petioluli usque ad 3 cm., plerumque circa 1·5 cm. longi. *Flores* in paniculas subangustas paucifloras axillares et terminales plerumque foliis duobus unifoliolatis instructas dispositi; paniculae ad 30 cm. longae, pedunculo communi ad 13 cm. longo suffultae; pedunculi partiales ad 5 cm. longi, bracteae variabiles, saepius 5–7 mm. longae, integrae, saepe amplexicaules, pubescentes; pedicelli 1–3 cm. longi, ut pedunculi indumento glanduloso pallide luteo plus minusve deciduo tecti. *Sepala* alba, patula, ad 1·5 cm. longa et 0·6 cm. lata, multinervia, apice mucronata, parum reflexa, extra praesertim ad basem et margines prope pubescentia, intra glabra. *Filamenta* 6 mm. longa, ligulata, glabra; antherae 1·5 mm. longae, apice rotundatae. *Ovarium* pallide brunneo-hirsutum; stylus circa 4 mm. longus, plumosus, stigmate clavato.

Indo-China. Burma: near Maymyo, Ani Sakan, 900 m., *Lace* 5927.

Clematis Craibiana, *Lace* [Ranunculaceae–Clematideae]; a *C. Meyeniana*, Walp. paniculis multo longioribus, foliolis tenuioribus basi rarissime leviter cordatis distinguenda.

Frutex scandens, ramulis gracilibus teretibus sulcatis pallidis vel purpureo-brunneis pilis albis brevibus mollibus sparse tectis. *Folia* pinnatim trifoliata, petiolo communi 4–7 cm. longo indumento ut ramulis tecto suffulta; foliola ovato-lanceolata vel ovata, apice acuminata, obtusiuscula, basi rotundata, rotundato-cuneata, truncata vel inferiora interdum leviter cordata, usque ad 11 cm. longa et 7 cm. lata, chartacea, glabra, subtus pallidiora, e basi vel fere e basi 5-nervia, nervis in foliis maturis pagina utraque sed praesertim inferiore conspicuis, reticulata, integra, petiolulis 2–5 cm. longis suffulta. *Paniculae* axillares, laxae, pluriflorae, ad 42 cm. longae, pedunculo communi ad 15 cm. longo suffultae; pedunculi partiales ad 5 cm. longi, ut pedunculus communis sulcati indumentoque ut ramuli praesertim ad nodos tecti; bracteae apice bi-vel tri-dentatae, interdum foliaceae, ad 7 mm. longae; pedicelli 1·5-4 cm. longi. *Sepala* 1·5 cm. longa, 3–5 mm. lata, alba, brunneo-nervosa, extra pallide luteo-puberula, intus glabra, apice truncato saepe reflexo. *Filamenta* 3–3·5 mm. longa, complanata, glabra, antheris 3·5 mm. longis connectivo excurrente breviter apiculatis. *Ovarium* dense albo-hirsutum; stylus plumosus, circiter 5·5 mm. longus, stigmate haud incrassato.

Indo-China. Burma: Maymyo Plateau, on shrubs and trees near stream, 1100 m., *Lace* 6122. Named after Mr. W. G. Craib who has assisted so much in working out plants from Maymyo.

Polygala pellucida, *Lace* [Polygalaceae]; a *P. glaucescente*, Wall., foliis crassioribus, floribus majoribus, sepalo uno persistente recedit.

Herba erecta, ad 20 cm. alta, caule angulato glabro parce divaricatim ramoso. *Folia* oblongo-oblanceolata, acuta, apiculata, basi in petiolum angustata, usque ad 3·5 cm. longa et 1·3 cm. lata, coriacea, glabra, pagina superiore sicco rugosa, inferiore pallidiora; costa supra impressa subtus prominente, nervis lateralibus utrinsecus 6–8 inconspicuis vel subtus fere prominulis, margine recurva, petiolo 1–3 mm. longa suffulta. *Racemi* usque ad 7 cm. (pedunculo communi 0·5–2 cm. longo

incluso) longi; pedicelli 0·5–1 mm. longi; bracteae minutae, cito deciduae; flores sulphurei, 5 mm. longi. *Sepala* tria exteriora inter se subaequalia, ovata vel oblongo-ovata, apice rotundata, 2 mm. longa, aureo-pellucido-punctata, mediano persistente, duo interiora aliformia, apice cucullata, basi cuneata, 4 mm. longa. *Petala* lateralia oblonga, apice rotundata, 3·5 mm. longa; carina cucullata, non cristata, 4 mm. longa. *Stigma* truncatum. *Capsula* obcordata, 3–3·5 mm. lata, margine superne in alam gradatim expansa, nervis satis conspicuis fere e capsulae apice radiantibus; semina globosà, parum lateraliter compressa, atra, minute tuberculata, pilis brevibus albis sparse tecta.

Indo-China. Burma: Maymyo Plateau, in marshy grasslands and on banks of streams, 1050 m., *Lace* 4844.

Buettneria integrifolia, *Lace* [Sterculiaceae–Buettnerieae]; ab affini *B. erosa*, Gagnep., foliis integris facile distinguenda.

Frutex grandis, scandens, ramulis inarmatis prominenter pluricostatis brunneis juventute pilis minutis stellatis hic illic instructis. *Folia* late ovata vel oblongo-ovata, apice subito longe acuminata, truncata, mucronata, basi cordata, lobis rotundatis, usque ad 20 cm. longa et 14·5 cm. lata, sicco tenuia, glabrescentia, praecipue ad nervos pilis paucis minutis stellatis hic illic instructa, e basi 5-nervia, nervis lateralibus (e costa ortis) utrinsecus 5–6 arcuatis intra marginem anastomosantibus cum nervis primariis pagina utraque prominentibus, nervis tranversis numerosis inter se parallelis pagina utraque conspicuis, margine integra, parum undulata, petiolo 3–11 cm. longo supra canaliculato sparse stellato-pubescente praecipue apicem versus suffulta; stipulae lanceolatae vel ovato-lanceolatae, acuminatae. *Inflorescentia* generis, sparse minuteque stellato-pubescens; pedunculi sulcati; pedicelli gracillimi, 4–7 mm. longi, medium versus articulati; alabastra conoidea, angulata; flores 0·8–1 cm. diametro. *Sepala* lanceolata, conspicue nervosa, acuta, 4–5 mm. longa, 1–1·5 mm. lata, basi inter se connata, minute sparse puberula, pellucido-notata. *Petala* ungui 2 mm. longo suffulta, limbi lobis deltoideis acutis 2–2·5 mm. latis, apice truncata, ad staminum tubum affixa, appendice anguste lanceolata 3–3·5 mm. longa glabra. *Ovarium* parum pubescens.

Indo-China. Burma: near Maymyo Plateau, Gokteik Gorge, 550 m., *Lace* 5454.

China. Yunnan: Szemao, 1530 m., *Henry* 13,370.

Euonymus longipes, *Lace* [Celastraceae–Celastreae]; ab *E. acanthocarpo*, Franchet, foliis saepe integris majoribus, pedunculo longiore robustiore, ab *E. cinereo*, Lawson, foliis saepe integris, inflorescentia multo longiore recedit.

Frutex grandis vel *arbuscula*, omnino glabra; ramuli quadranguli, bifacialiter canaliculati; rami teretes, tuberculis minutis dense tecti. *Folia* oblongo-obovata ad ovata, apice obtuse acuminata, basi cuneata rotundatave, interdum parum inaequilateralia, 6–11·5 cm. longa, 3–5·5 cm. lata, coriacea, juvenilia viridia, matura griseo-viridia, subtus parum pallidiora, nervis lateralibus utrinsecus 5–6 obliquis intra marginem anastomtsantibus pagina utraque conspicuis, margine parte dimidia superiore saepe

obscurius crenulata, rarius crenata; petioli 1 cm. longi, supra conspicue canaliculati. *Cymae* axillares, pedunculo communi 4–9·5 cm. longo ut ramulis quadrangulari et bifacialiter canaliculato suffultae; pedunculi partiales 1–3·5 cm. longi, ultimi pedicellis subaequilongi; bracteae minutae, triangulares, serrulatae, fugaces; pedicelli graciles, saepius 4 mm. longi: flores 4–meri. *Calycis* lobi, rotundati, recurvi, 2 mm. lati. *Petala* viva viridi-alba, orbicularia 3 mm. diametro, late unguiculata. *Filamenta* 1·5 mm. longa, antheris globosis. *Discus* 2·5 mm. diametro. *Ovarium* echinatum, stylo paulo ultra 1 mm. longo.

Indo-China. Burma: Maymyo Plateau, an undershrub or small tree in damp localities, 1050 m., *Lace* 6149.

Allospondias laxiflora, *Lace* [Anacardiaceae–Spondieae]: ab *A. lakonensi*, Stapf, foliis multo majoribus, panicula terminali, fructu eum *Odinae* simulante recedit.

Arbor excelsa, decidua, cortice laevi argenteo. *Folia* alterna, apices versus ramulorum sita, imparipinnata, usque ad 65 cm. petiolo communi 5–10 cm. longo incluso longa; foliola opposita vel subopposita interdumve alterna, utrinque 6–9 juga, ovato-lanceolata, ovato-oblonga oblongave apice abruptius longe acuminata, acuta, basi saepius rotundata, interdum inaequilateralia, superiora interdum latere altero cuneata, altero rotundata, usque ad 17 cm. longa et 6·5 cm. lata, inferioribus quam aliis conspicue minoribus, chartacea, pilis albis divaricatis pagina superiore hic et illic instructa, inferiore ad nervos nervulosque densius instructa, subtus pallidiora, nervis lateralibus utrinque 12–14 brunneis arcuatis subtus prominulis, margine integra, sessilia, terminali a lateralibus 1–2·5 cm. distante quam aliis parum minore, basi cuneata; rhachis ut petiolus teres sed sicco plus minusve canaliculata pilis brunneis brevibus molliter tomentosa. *Flores* ante folios evoluti, in paniculam copiose ramosam terminalem pubescentem 50 cm. vel ultra longam dispositi; bracteae subulatae linearesve, 1–1·5 mm. longae; pedicelli brevissimi, aggregati. *Sepala* 5, libera, imbricata, ovata, apice obtusa, circiter 0·5 mm. longa, dorso puberula, persistentia sed haud accrescentia. *Petala* 5, viva alba, ovata, apice parum cucullata, 2·5–3 mm. longa, 3-nervia, dorso minute puberula. *Stamina* 10, filamentis inferne dilatatis circa 1 mm. longis minutissime puberula. *Discus* vivus aurantiacus, 5–lobatus, lobis retusis. *Styli* 5, liberi, stigmatibus truncatis. *Drupa* oblonga, basi inaequilateralia, circa 1·2 cm. longa; semina solitaria, pendula, radicula superiore.—*Buchanania laxiflora*, Kurz in Journ. As. Soc. Beng., vol. xli. p. 304 et For. Fl. Burma, vol. i. p. 307; Brandis, Indian Trees. p. 206 –certe quoad flores, foliorum descriptione exclusa.

Burma. Thaton District: a conspicuous tree on the dry limestone hills which rise suddenly out of the plain on both banks of the lower Salween river, *Lace* 4574 (flowers). *J. C. Murray* (fruit and leaves).

Burmese name, Taung-gwė.

Uraria barbata, *Lace* [Leguminosae–Hedysareae]: ab *U. cordifolia*, Wall., cui affinis, foliis tenuioribus conspicue ciliatis, fructu pilis apice uncinatis tecto differt.

Suffrutex grandis, ramis crassis pallide brunneis striatis pilis longis albis divaricatis tectis. *Folia* late ovata, acuminata, apiculata, basi anguste cordata vel rarius truncata, usque ad 26 cm. longa et 22 cm. lata, chartaceo-membranacea, pagina utraque pilis longis divaricatis basi tuberculatis parce instructa, nervis lateralibus utrinsecus 10–11, nervis transversis inter se parallelis, margine conspicue dense ciliata; petiolus 1–3 cm. longus, indumento ei ramorum simili tectus; stipulae scariosae, striatae, dorso pilis longis albis instructae, diu persistentes, *Inflorescentia* e racemis longis et axillaribus et terminalibus laxe paniculatis constituta, usque ad 80 cm. longa; flores 3–12–fasciculati; bracteae scariosae, lineari-lanceolatae, longe acuminatae, valde nervosae et ciliatae; pedicelli 5–7 mm. longi, glanduloso-pubescentes. *Calycis* ante fructum maturum decidui tubus circa 1·5 mm. longus, lobi longe subulato-acuminati, infimo ad 3·5 mm. longo; calyx totus sed praesertim lobi pilis longis albis divaricatis tectus. *Vexillum* obovatum, apice rotundatum, basi cuneatum, haud auriculatum, 5 mm. longum; alae et carina vexillo breviores. *Staminis* vexillaris filamentum 3·5 mm. longum. *Legumen* pilis apice uncinatis tectum; semina 1–6, brunnea, laevia, haud nitida.—*U. cordata*, Wall., var. *barbata*, Wall. Cat. 5679 B et C.

Indo-China. Burma: Katha District, *Lace* 4811; Ruby Mines District, Wapyudaung, 370 m., *Lace* 5981; near Maymyo Plateau, Gokteik Gorge, 615 m., *Lace;* Upper Chindwin, Tamu, *Meebold* 7597; Taong Dong, Wall. Cat. 5679 B. Cult. Hort. Bot. Calc. e Taong Dong, Wall. Cat. 5679 C.

Mucuna Collettii, *Lace* [Leguminosae–Phaseolae]; a *M. macrocarpa*, Wall., foliolorum forma et indumento facile distinguenda.

Frutex late volubilis, caule basi 0·5 m. diametro, ramis crassis, cortice laevi, ramulis fulvo-pubescentibus. *Stipulae* triangulares, acuminatae, acutae, 3–4 mm. longae, cito caducae; petiolus 6–15·5 cm. longus, striatus, tomento rubiginoso deciduo tectus; foliola lateralia inaequilateralia, latere altero dimidiatim lanceolato-oblonga, basi late cuneata, altero dimidiatim late ovata, basi anguste cordata, apice saepius breviter acuminata sed interdum rotundata et emarginata, 11–15 cm. longa, 6–10 cm. lata; foliolum terminale a lateralibus 3·5–4 cm. distans, ellipticum vel oblongo-ellipticum, usque ad 17 cm. longum et 10 cm. latum; foliola omnia apiculata, chartacea, viridia, supra primo sparse setosa, demum glabra, subtus molliter cupreo-brunneo-tomentosa, nervis lateralibus utrinsecus 5–7 supra conspicuis subtus prominentibus, petiolulis validis 0·7–1 cm. longis suffulta. *Inflorescentia* racemiformis, e ligno vetustiore fasciculatim orta, usque ad 20 cm. longa, rhachi brunneo-pubescente; pedicelli validi, recti curvative, ad 1·5 cm. longi, solitarii vel 2–3 pedunculis brevissimis secundariis gesti, molliter pubescentes. *Calyx* diu persistens, extra pilis brevibus griseo-brunneis et setis satis numerosis pallide luteo-brunneis tectus, intra brunneo-tomentosus, tubo 1·5 cm. diametro circiter 1 cm. longo saepe obliquo, lobis supremis quam infimo 7–9 mm. longo multo brevioribus et latioribus, lateralibus 5 mm. longis. *Corolla* 5–6 cm. longa, purpurea vel purpureo-viridis; vexillum late ellipticum, 2·8 cm. diametro, carina circiter dimidio brevior, superne ciliolatum; alae extra basem versus pubescentes,

superne et inferne ciliatae, medio non ciliatae; carina alas superans, basi ciliata. *Staminum* tubus 5 cm. longus, antheris filamentorum brevium barbatis. *Ovarium* pilis rigidis brevibus obtectum, stylo barbato superne glabro. *Legumina* ad 38 cm. longa, 3·5–4 cm. lata, 1–1·5 cm. crassa, inter semina constricta, valvis planis, suturis obliquis, apice breviter acuminata, basi cuneata, stipite brevissimo suffulta, tomento rufo tecta demum glabra nisi ad suturas. *Semina* planiuscula, oblonga orbiculariave, ad 2·8 cm. longa et 2·3 cm. lata, fusco-brunnea vel nigra, hilo pallido margine tota quarto breviore.

Indo-China. Burma: Maymyo Plateau, 1050 m., *Lace* 5866; *C. G. Rogers* 19; *Hauxwell*; Shan Hills, 1230 m., *Collett* 458.

China. Yunnan: Szemao, 1530 m., *Henry* 11,702.

Pueraria Lacei, *Craib* [Leguminosae–Phaseoleae]; a *P. alopecuroidè,* Craib, floribus multo majoribus facile distinguenda.

Suffrutex late scandens; ramuli 4 mm. diametro, ferrugineo-hirsuti. *Folia* pinnatim trifoliolata, petiolo 4–7·5 cm. longo suffulta; stipulae oblongae, apice rotundatae, basi bilobae, medio affixae, 2 cm. longae, 7 mm. latae; foliola ovata vel terminalia subrhomboidea, apice acuminata sensim acutata, basi lateralia rotundata, terminalia obtuse cuneata, 6–9 cm. longa, 3·3–5·5 cm. lata, subchartacea, margine integra, ciliata, supra tenuiter adpresse pilosa, subtus sericea, nervis lateralibus utrinque circiter 6 supra conspicuis subtus prominentibus, nervis transversis obscuris; petioluli 0·5 cm. longi, foliolo terminali a lateralibus 2–2·5 cm. distante; stipellae lineares, acutae, 1·2–1·5 cm. longae, usque ad 1·5 mm. latae. *Racemi* solitarii axillares vel ad apices ramulorum paniculati, pedunculo communi 7–10 cm. longo bracteis aliquot vacuis stipulis forma similibus sed minoribus instructo; bracteae lineari-lanceolatae 1–1·5 cm. longae, 2–3 mm. latae, ferrugineo-pilosae; pedicelli 3 mm. longi, apice bracteolis 2 ovato-lanceolatis acutis 4 mm. longis 1·5 mm. latis instructi. *Calycis* extus ferrugineo-hirsuti intus appresse hirsuti, tubus circiter 0·5 cm. longus, lobi duo supremi in unum paulo ultra 1 cm. longum, apice breviter bifidum connati, lobus infimus lateralibus paulo longior, 1·5 cm. longus. *Corolla* longe exserta; vexillum reflexum late ellipticum, emarginatum, basi auriculatum, 1·4 cm. longum, 1·2 cm. latum, ungui 4 mm. longo suffultum; alae oblongae, basi longe appendiculatae, 1·3 cm. longae, ungui 0·5 cm. longo; carina obtusa inappendiculata, 1·1 cm. longa, 0·5 cm. lata, ungui 6 mm. longo. *Stamen* vexillare ima basi liberum, medio cum ceteris connatum; antherae uniformes, parvae. *Ovarium* stipitatum, adpresse hirsutum, stylo brevi glabro, stigmate parvo capitato pilis perpaucis instructo.

Indo-China. Burma: Thayetmyo District, *Lace* 2685.

Eriosema pilosum, *Lace* [Leguminosae-Phaseoleae]; ab *E. chinense,* Vogel, indumento longo albo facile distinguendum.

Herba perennis; caules graciles, 12–21 cm. alti, lignosi, striati, simplices furcative. *Folia* lanceolata, oblongo-lanceolata vel oblonga, minute apiculata, basi rotundata, ad 3·8 cm. longa, 1 cm.

lata, chartaceo-membranacea, supra viridia, pilis longis albidis divaricatis praetereaque brevius pubescentia, subtus griseo-albida, tomento denso albido et glandulis aureis et ad nervos pilis longis albis divaricatis instructa, nervis lateralibus utrinque 6 supra impressis subtus prominulis, margine parum incurva, longe ciliata, petiolo 1–2 mm. longo indumento ut caule instructo suffulta; stipulae scariosae, angustae, longe acuminatae, 3–4 mm. longae, valde nervosae, persistentes. *Flores* axillares, subsessiles, lutei. *Calyx* 5 mm. longus, dentibus acutis, infimo aliis parum longiore, extra glanduloso-pilosus, intra ad dentes pilis paucis albis adpressis instructus. *Vexillum* 8–9 mm. longum, rotundatum, apice emarginatum, basi cuneatum, auriculatum, dorso pilosum; alae 7–8 mm. longae, fere glabrae; carina 6 mm. longa, apice rotundata, dorso glanduloso-pilosa. *Ovarium* pilis longis albis obtectum, stylo glabro, stigmate parvo capitato. *Legumen* oblongum, apiculatum, 0·8–1 cm. longum, 0·5–0·6 cm. latum, glandulosum, pilis longis albis dense pilosum; semina oblonga, brunnea, fusco-maculata, glabra, 3 mm. longa.

Indo-China. Burma: Maymyo Plateau, 1050 m., *Lace* 6328.

Bauhinia sericea, *Lace* [Leguminosae–Bauhinieae]; *B. glabrifoliae*, Baker et *B. piperifoliae*, Roxb., affinis, ab illa floribus majoribus, ab hac ovarii suturis villosis recedit.

Frutex late scandens, cirrhosus; ramuli primo griseo-tomentelli, cito glabri, demum brunnei, sulcati. *Folia* late vel anguste ovata, saepius plus minusve bifida, saepe in ramulis juvenilibus usque ad basem, saepe prope inflorescentiam integra et apice rotundata, lobis plus minusve triangularibus apice obtusis, basi truncata vel late haud alte cordata, usque ad 13·5 cm. longa et 11·5 cm. lata, subcoriacea, nitida, glabra nisi nervis basi pilis paucis primo instructis, e basi 7–nervata, duobus basalibus minus conspicuis saepe additis, nervis supra conspicuis subtus prominentibus, nervulis rete laxum pagina utraque conspicuum formantibus, petioli ad 6 cm. longi, utrinque tumidi, primo breviter arcte albopubescentes, mox glabri. *Flores* in paniculas corymbiformes 8–13 cm. diametro dispositi; alabastra globosa, breviter acuminata, subsericea; bracteae angustae, acutae, 4 mm. longae; pedicelli 1·5–2 cm. longi, graciles, breviter sericei; bracteolae duae, angustissimae, circiter 2 mm. longae, bene infra pedicelli medium sitae. *Calycis* tubus 3–3·5 mm. longus, limbo saepius 3-fido 5–6 mm. longo intra glabro. *Petala* viva gilvo-albida, obovata, unguiculata, 0·8–1 cm. longa, tribus superioribus margine undulatis, omnia extra medio dense pubescenta et posteriore fere glabro excepto intus ad medium et ad unguem pubescentia. *Stamina* fertilia 3, filamentis 1·2–1·4 cm. longis glabris superne angustatis, antheris oblongis 2·5 mm. longis; staminodia 3, filamentis gracillimis 5 mm. longis. *Ovarium* ad suturas villosum. lateribus glabrum, stipite brevi; stylus primo incurvus, ventrice fere ad apicem villosus; stigma mediocre.

Indo-China. Burma: Ani Sakan and Maymyo, 800–1050 m., *Lace* 6208.

Ripe pods, believed to belong to this species, were found on the ground in the hot weather. They are very dark brown in colour,

shining, glabrous, slightly curved, 37–40 cm. long, 3·5–4·2 cm. broad and about 1·3 cm. thick at the seeds, the apex is rounded and apiculate and the base gradually narrowed into the 6–10 cm. long stipe. The valves are strongly nerved, considerably constricted between the seeds and thickened along both sutures. Seeds 14–18, narrowly obovate or elliptic, turgid, dark brown, about 2·2 cm. long by 1·4 cm. across.

Acacia insuavis, *Lace* [Leguminosae–Mimoseae]; ab *A. pinnata*, Willd., foliis longioribus, foliolis majoribus, capitulis majoribus longius pedunculatis, inter alia recedit.

Frutex grandis, scandens, ramis late extensis cinereo-corticatis, ramulis juventute viridibus striatis molliter crispatim albo-pubescentibus lenticellatis; ramuli, petioli inflorescentiaeque ramuli aculeis rectis 1 mm. longis vel in ramulis usque 3 mm. attingentibus longioribus interdum parum curvatis pallide brunneis glabris hic illic instructi vel interdum inarmati. *Folia* 16–25 cm. longa (petiolo excluso), petiolo 3–5 cm. longo pubescente striato prope basem glandula oblonga sessili ornato suffulta, rhachi dense crispatim tomentosa superne glandulis 1–4 parvis sessilibus instructa; stipulae parvae, triangulares, cito caducae; pinnae utrinque 13–30, 2·5–9·5 cm. longae, rhachi dense crispatim albotomentosa; foliola utrinque 30–80, imbricata, anguste linearia, mucronata, basi inaequilateralia, truncata, 5 mm. longa, vix 1 mm. lata, nervulis obscuris, pagina utraque glabra, ciliolata. *Capitula* in paniculas magnas terminales foliatas disposita, pallide lutea, 1–1·2 cm. diametro, pedunculis 2–5 cm. longis solitariis vel usque ad 5 in axillo quoque pilis brevibus crispatis albis instructis suffulta; bracteae spatulatae, pubescentes, 1·5 mm. longae. *Calyx* infundibuliformis, 2·5 mm. longus, extra puberulus, lobis triangularibus acutis vix 1 mm. longis ciliatis. *Corolla* 3 mm. longa, lobis triangularibus acutis 1 mm. longis ciliatis dorso pubescentibus. *Stamina* numerosissima (ultra 100), 4·5–5 mm. longa, basi parum connata, glabra, antheris parvis apice glandula stipitata fugace ornatis. *Ovarium* sericeum, stipite 1·5 mm. longo suffultum, stylo 4 mm. longo stamina superante.

Indo-China. Burma: Ani Sakan, near Maymyo, 900 m., *Lace* 6173. Burmese name, Subok.

Occurs in many parts of Burma, in forests and near villages where it is probably sometimes cultivated. The branches and leaves when crushed give out a most foetid odour.

Acacia macrocephala, *Lace* [Leguminosae–Mimoseae]; ab *A pennata*, Willd., capitulis multo majoribus facile distinguenda.

Frutex scandens; ramuli brunnei, striati, multilenticellati, primo ut petioli, rhachis pedunculique tomento brevi denso rubiginoso furfuraceo-glanduloso tecti, aculeis parvis curvatis. *Folia* usque ad 22 cm. longa, petiolo circa 4 cm. longo striato glandula oblonga sessilia 0·75 mm. alta basin versus instructo suffulta; rhachis canaliculata superne glandulis tribus sessilibus instructa; stipulae circa 3 mm. longae, cito deciduae; pinnae utrinque 12–13, rhachi crispatim pubescente, 3–8·5 cm. longae, foliola utrinque 35–65, inferiora parum imbricata, linearia, acuta, basi truncata, 5–8 mm. longa, 1 mm. lata, costa tenui supra fere obsoleta infra

inconspicua, nervis saepissime omnino obscuris, glabra, praesertim inferne sparse ciliata. *Capitula* in paniculas terminales foliatas disposita, 2–2·5 cm. diametro, pedunculis 3·5–4·5 cm. solitariis vel usque 5-fasciculatis suffulta; bracteae ultra 2 mm. longae, lineares, apice latiores et incrassatae, glanduloso-pubescentes. *Calyx* infundibuliformis, 3·5–4 mm. longus, extra pubescens, intra glaber, lobis 1·5–2 mm. longis deltoideis lateribus parum convexis, acutis. *Corolla* 5 mm. longa, nervo mediano brunneo conspicuo, lobis 1·5 mm. longis deltoideis lateribus parum convexis obtusiusculis vel sicco ob marginem incurvum breviter pseudoacuminatis ciliolatis dorso breviter puberulis. *Stamina* libera, numerosissima, filamentis 1 cm. longis glabris, antheris apice glandula stipitata decidua ornatis. *Ovarium* breviter hirsutum, stipite 1·5 mm. longo glabro suffultum, stylo 0·8 cm. longo inferne sparse puberulo.

Indo-China. Burma: Bhamo District, Sinlum Kaba, 1700 m., *Lace* 5787.

Albizzia crassiramea, *Lace* [Leguminosae–Mimoseae]; ab *A. Gamblei*, Prain, cui affinis, foliolis majoribus, legumine rubro-brunnea haud stramineo ad semina prominenter laxe reticulato distinguenda.

Arbor mediocris; ramuli validi, 8 mm. diametro, striati, puberuli, lenticellati, fusco-corticati. *Petioli* ad 7·5 cm. longi, rhachem subaequantes vel saepius ea longiores, striati, puberuli, supra haud alte canaliculati, glandula oblonga rotundatave carnosa sessili prope basem instructi; pinnae utrinsecus plerumque 3, rarius 2, terminales usque ad 18 cm. longae, rhachilla glandula oblonga plana sessili inter paria duo suprema foliolorum saepius instructa; foliola utrinsecus 2–5, oblonga vel oblongo-obovata vel terminalia obovata vel oblongo-obovata, apice rotundata, brevissime apiculata, basi plus minusve inaequilateralia, usque ad 7·5 cm. longa et 4 cm. lata, firme chartacea, supra glabra, nitida, subtus pilis brevibus pallide brunneis adpressis praetereaque pilis longioribus divaricatis ad costam nervosque praesertim versus costae basem instructa, nervis lateralibus utrinque ad 6 supra prominulis subtus prominentibus; stipulae fugaces. *Capitula* in paniculam grandem juventute ferrugineo-tomentellam disposita, pedunculo usque ad 3·5 cm. longo striato puberulo suffulta; alabastra albo-pubescentia. *Calyx* 2 mm. longus, extra aureo-brunneo-puberulus, intra glaber, dentibus minutis. *Corolla* 5 mm. longa, lobis oblongo-lanceolatis acutis 2 mm. longis extra pubescentibus intra glabras. *Staminum* tubus irregularis, ad 4 mm. altus, parte filamentorum libera usque ad 3 cm. longa. *Ovarium* glabrum, stylo 3·5 cm. longo. *Legumen* ad 19 cm. longum et 2·2 cm. latum, rubro-brunneum, glabrum, valvis ad semina prominenter laxe reticulatis.

Indo-China. Burma: Maymyo Plateau, 1000 m., *Lace* 5910.

Oxyspora rupicola, *Lace* [Melastomaceae–Oxysporeae]; ab *O. cernua*, Hook. f. et Thoms., inter alia foliis conspicue minoribus recedit.

Suffrutex sarmentosus, ramulis primo obscure quadrangulis sulcatis minute squamosis mox glabris et conspicue quadrangulis

fistulosis pallide brunneo- vel cinereo-corticatis. *Folia* lanceolata, oblongo-lanceolata, apice acuminata, acuta, basi rotundata lateve cuneata, ad 13·8 cm. longa et 4·5 cm. lata, chartacea, pagina superiore minute tuberculata, inferiore pallidiora, glabra, e basi 5-nervia, nervis primariis et secondariis supra conspicuis subtus prominentibus, distanter minute serrulata, petiolo ad 3·5 cm. longo supra canaliculato summo apice barbato-piloso suffulta. *Inflorescentia* terminalis, pedunculo communi incluso ad 21 cm. longa et 7 cm. diametro, e cymis 3–7 floris sed saepissime 3–1-floris oppositis pedunculo usque ad 2·8 cm. longo suffultis constituta; pedicelli circa 5 mm. longi; bracteae pedunculorum partialium 3 mm. longae, iis pedicellorum duplo longiores. *Receptaculum* oblongo-turbinatum, 8 mm. longum. *Calyx* brevis, lobis acuminatis dorso carinatis. *Petala* viva punicea, obovato-elliptica, apice caudato-acuminata, 1·1 cm. longa, 7 mm. lata. *Antherae* longiores 1 cm. longae, breviores 6 mm. longae, connectivo basi producto praesertim in antheris brevioribus quarum calcar 1 mm. longum; filamenta 6–7 mm. longa. *Stylus* 1·4 cm. longus, saepe uncinatus.

Indo-China. Burma: near Maymyo Plateau; Gokteik Gorge, on rocks in middle of stream, 300 m., *Lace* 4978.

Lonicera Buchananii, *Lace* [Caprifoliaceae–Lonicereae]; a *L. macrantha*, DC. et *L. Leschenaultii*, Wall., foliis basi cuneatis nec truncatis nec cordatis indumento tenuiore subtus obtectis distinguenda.

Frutex? scandens, ramulis teretibus tomento molli griseo-albo brevi plus minusve deciduo tectis. *Folia* late ovata, apice acuta, mucronata, basi cuneata, ad 4·5 cm. longa et 2·7 cm. lata, chartaceo-membranacea, supra nitida, costa nervisque basem versus exceptis glabra, subtus glauca et pilis brevissimis albis pubescentia, nervis lateralibus utrinsecus plerumque 5 gracilibus arcuatis intra marginem integram parum recurvam anastomosantibus supra impressis subtus prominentibus; petioli graciles, supra canaliculati, 5–7 mm. longi, pubescentes. *Pedunculi* axillares, biflori, 1·2–2·2 cm. longi, superne parum incrassati; bracteae binae, anguste lanceolatae, petiolatae, 0·5–1·4 cm. longae, indumento ei foliorum simili instructae; bracteolae ovatae, apice rotundatae acutaeve, paulo ultra 1 mm. longae, ciliatae. *Receptaculum* ovoideum, 3 mm. altum, inferne subglabrum, superne sparse pubescens. *Calycis* tubus vix 1 mm. longus, dentes 5, deltoidei, acuti, 1 mm. longi, dorso pubescentes, intra breviter adpresse pubescentes, ciliati. *Corollae* tubus gracilis, superne parum ampliatus, 3 cm. longus, extra pilis albis deflexis puberulus, intra pubescens, limbo bilabiato 2·5 cm. longo; labium posticum 4-lobum, lobis 3–5 mm. longis lateralibus quam medianis saepe longioribus apice obtusis margine parum undulatis, anticum circiter 2 mm. latum. *Stamina* exserta, antheris curvatis circa 4 mm. longis, filamentis glabris. *Stylus* filiformis, stamina superans, 6 cm. longus, glaber, stigmate capitato.

Indo-China. Burma: Myitkyina District, Watugyi, 180 m., *E. M. Buchanan* 11 (anno 1912).

Marsdenia carnosa, *Lace* [Asclepiadaceae–Marsdenieae]; ab affini *M. Jenkinsii,* Hook. f., pedicellis brevioribus floribusque conspicue minoribus recedit.

Frutex volubilis, caule crasso fistuloso; ramuli teretes, striati, tomento brevi denso griseo-brunnea tecti. *Folia* ovata vel ovato-lanceolata, basi cordata truncatave, apice subitius acuminata, obtusa, quoad magnitudinem variabilia, usque ad 15 cm. longa et 10 cm. lata, sicco coriacea, pagina utraque puberula, inferiore pallidora, nervis lateralibus utrinsecus 6–8 primo obliquis rectis dein marginem versus curvatis intra marginem anastomosantibus supra prominentibus subtus saepissime valde latis planisque, nervis transversis paucis inconspicuis; petioli ad 7·5 cm. longi, canaliculati, indumento ut caulis instructi. *Inflorescentia* axillaris, densa, globosa, 2–3 cm. diametro; pedunculus communis 1·5–3 cm. longus, ut ramuli tomentosus; pedicelli 0·5 cm. longi, pilis brevibus pallide brunneis dense tomentosi. *Calyx* 5 partitus, segmentis oblongis vel obovato-oblongis apice obtusis 4 mm. longis breviter ciliatis interioribus margine hyalinis omnibus dorso ut pedicellis tomentosis intra glabris. *Corollae* tubus superne dilatatus, circa 3 mm. longus, lobis 5 dextrorsum tortis apice rotundatis 3 mm. longis ciliolatis dorso glabris intra praesertim ad faucem villosis. *Coronae* squamae summo apice tantum liberae, inferne crassae, carnosae et ad staminum tubum adnatae, staminibus circiter dimidio breviores. *Antherarum* apices membranaceae 1 mm. longae. *Ovarium* glabrum.

Indo-China. Burma: Maymyo Plateau, 1050 m., *Lace* 6143; *English* 31.

Swertia kachinensis, *Lace* [~~Melastomaceae~~ Gentianaceae–Swertieae]; a *S. angustifolia,* Ham., floribus magis numerosis, ramulis copiosis adscendentibus recedit.

Herba erecta, ramulis numerosis adscendentibus, caule 4-angulato vel 4-alato rubido pallideve brunneo 40–55 cm. alto. *Folia* subsessilia, lanceolata vel late lanceolata, subacuta, 4–5 cm. longa, 1 cm. lata, chartacea, glabra, e basi trinervia, nervis subtus prominentibus, nervis transversis subobscuris; ramorum floriferorum folia minora, anguste lanceolata. *Flores* numerosissima, 1–5 in axillo quoque, 4–meri; pedicelli 0·5 -1 cm. longi. *Sepala* linearia, subacuta, 6 9 mm. longa, 1 mm. lata, trinervia. *Corollae* segmenta ovata, acuta, basi angustata, 7 mm. longa, 4 mm. lata, purpureo-maculata vel lineolata, margine incurva, glandula unica magis minusve transverse elliptica squama fimbriato-marginata late ovata quam glandula majore 1 mm. longa obtecta basi ornata. *Filamenta* complanata, 3 mm. longa, antheris oblongis. *Ovarium* ambitu oblongo lanceolatum.

Indo-China. Burma; Ruby Mines District; Bernardmyo, 1540 m., *Lace* 6307.

Utricularia brevilabris, *Lace* [Lentibulariaceae]; ab *U. hirta,* Klein, cui affinis, scapo glabro, labio inferiore quam calcare saltem dimidio breviore differt.

Herba terrestris, erecta, 2–11 cm. alta. *Folia* spatulata vel lineari-spatulata, saepius 2–4 mm. longa et paulo ultra 1 mm,

lata, basi in petiolum plerumque lamina longiorem angustata. *Scapus* gracillimus, simplex, glaber, flores usque ad 5 gerens, squamis paucis lanceolatis longe acuminatis basi affixis circa 1 mm. longis instructus; pedicelli 1-2 mm. longi; bracteae squamis similes; bracteolae binae, minutissimae. *Calycis* segmenta inter se inaequalia, obovata, apice rotundata, circa 1·5 mm. longa, inferiore quam superiore latiore et paulo breviore. *Corolla* purpurea, ore minutissime puberula; labium posticum oblongo-oblanceolatum, apice obtusum, 2·5 mm. longum, 1 mm. latum, anticum trilobatum, lobis rotundatis, vivum 4–5 mm. latum, circa 2 mm. longum, maculis duobus luteis basi ornatum; calcar 5 mm. longum, gracile, apicem versus subacutum angustatum, horizontale, rectum vel apice parum sursum curvatum. *Semina* laxe et graciliter reticulata.

Indo-China. Burma: Maymyo Plateau, in swampy ground. 1050 m., *Lace* 5489..

Utricularia Rogersiana, *Lace* [Lentibulariaceae]; ab affini *U. punctata*, Wall., partibus omnibus multo gracilioribus et corollae colore diverso differt.

Herba natans. *Folia* submersa, multipinnata, segmentis ultimis capillaribus utriculis numerosis instructis. *Scapus* erectus, gracilis, simplex, sparse puberulus, 2–4-florus; squamae suborbiculares, apice rotundatae, basi cordata, bracteis minores; pedicelli 3–6 mm. longi; bracteae late ovatae, apice obtusae, basi cordatae, 2 mm. latae, vix 2 mm. longae. *Calycis* segmenta suborbicularia, apice rotundata, emarginulata, superiore ultra 2 mm. longo et lato quam inferiore paulo majore. *Corolla* pallida, purpureo-venosa; labium superum oblongo-ovatum, apice obtusum. 5 mm. longum, inferum suborbiculare, apice rotundatum, 8 mm. longum, 7 mm. latum; calcar circa 1·75 mm. longum, superne subito breviter angustatum, summo apice obtusum. *Ovarium* ovoideum, paulo ultra 1 mm. altum, glabrum.

Indo-China. Burma: Maymyo Plateau, 1050 m., *Lace* 5899. Named after Mr. C. Gilbert Rogers, Conservator of Forests, who kindly assisted in the collection of this plant and many others.

Utricularia subrecta, *Lace* [Lentibulariaceae]: ab *U. caerulea*, Linn., caule graciliore, floribus majoribus, calcare longiore acuto recedit.

Herba erecta interdum volubilis 6–30 cm. alta, glabra. *Folia* linearia vel lineari-spatulata, 1–3 cm. longa, vix ultra 1·5 mm. lata, apice rotundata vel obtusa, basi in petiolum usque ad 3 cm. longum angustata; utriculi breviter petiolati 1·5 mm. diametro. *Scapus* simplex, flores 1–7 (saepissime 3–5) gerens, squamis paucis acutis 2–3 mm. longis basi haud productis; pedicelli ad 1 cm. longi; bracteae persistentes, squamis similes; bracteolae binae. anguste lineares, circa 2 mm. longae. *Calycis* segmenta inter se subaequalia, ovata, acuminata, acuta, 4–5 mm. longa. *Corolla* caerulea vel puniceo-purpurea; labium superum lineari-oblongum, emarginatum, 6–7 mm. longum, 2 mm. latum, infimum lateribus reflexum, vivum 5 mm. diametro, emarginatum, ore pilis brevibus instructum; calcar 6-8 mm. longum, anguste conicum, apice acutum, parum arcuatum vel sicco fere rectum, angulum

rectum cum labio infimo efficiens. *Capsula* ovoidea, in calyce inclusa; semina globosa, longitudinaliter brunneo-costata.—*U. caerulea*, Coll. et Hemsl. in Journ. Linn. Soc., vol. xxviii, p. 101, vix Linn.

Indo-China: Burma: Shan Hills Plateau; Koni, 1540 m., *Collett* 469; Maymyo Plateau, 1050 m., *Lace* 3151, 4845, 5488, 5505.

Strobilanthes mogokensis, *Lace* [Acanthaceae–Ruellieae]; a *S. tamburense*, C. B. Clarke, spicis angustioribus, bracteis lanceolato-oblongis, corolla longiore recedit.

Frutex lignosus, caulibus sulcatis pallide brunneis praesertim ad nodos lenticellatis; ramuli juventute pilis albis glandulosis transverse septatis tecti, demum glabri. *Folia* late ovata, breviter acuminata, summo apice obtusa, inferiora basi truncata vel subito anguste cuneata, superiora truncata, sessilia, anguste cordata, usque ad 6 cm. longa, 4·5 cm. lata, chartacea pilis albis latis transverse septatis pagina utraque glanduloso-pubescentia, nervis lateralibus utrinsecus 6–7 tenuibus supra conspicuis subtus prominulentibus, margine crenulata, ciliata; petioli foliorum inferiorum ad 1·5 cm. longi, supra canaliculati. *Spicae* et ramos et ramulos breves laterales terminantes et pauce in foliis supremis axillares, glanduloso-pubescentes, ad 5 cm. longae, vix 1 cm. diametro; bracteae lanceolato-oblongae, 1 cm. longae; bracteolae anguste lanceolatae, 7–8 mm. longae, ut bracteae extra glanduloso-pubescentes, intra glabrae. *Calyx* 1 cm. longus, fere ad basem bilabiatus, labio altero magis minusve ad medium lobato altero fere ad basem 2-fido, lobis omnibus lanceolatis acute acuminatis ciliatis dorso glanduloso-pubescentibus intra adpresse pubescentibus. *Corolla* arcuata, praeclare late ventricosa, 3 cm. longa, extra sparse pubescens intra nisi ad staminum insertionem glabra, parte cylindrica 8 mm. longa, lobis rotundatis. *Stamina* 4, filamentis fere glabris nisi ad basem. *Ovarium* pilis erectis albobrunneis apice pennicellatum, stylo 2·5 cm. longo superne pilis longiusculis albis divaricatis instructo. *Capsula* 1 cm. longa, apicem versus pubescens; semina 2·5 mm. longa, fere 2 mm. lata, complanata, pilis brevibus elasticis tecta.

Indo-China. Burma: Ruby Mines District, Bernardmyo to Mogok, 1850 m., *Lace* 6018.

Gutzlaffia glandulosa, *Lace* [Acanthaceae–Ruellieae]; habitu *G. exareolatae*,* similis sed seminibus haud glabris differt.

Frutex, caule sulcato fere glabro. *Folia* ovato-lanceolata vel ovata apice caudato-acuminata, apiculata, basi acuminata, ad 15 cm. longa, 7 cm. lata, chartaceo-membranacea, pagina superiore pilis albis crassis hic illic instructa, inferiore ad nervos pilis adpressis reflexis dense instructa praetereaque pilis albis crassis tranverse septatis ad nervos nervulosque praesertim superne et marginem versus additis, nervis lateralibus utrinsecus 8–10 arcuatis supra conspicuis subtus prominentibus, acumine excepto serrato-crenata, petiolo 0·5–2·5 cm. longo breviter pubescente

* *Gutzlaffia exareolata*, Lace, comb. nov. = Strobilanthes exareolatus, *C. B. Clarke.*

supra canaliculato suffulta. *Spicae* glanduloso-pilosae, laxae, angustae, usque ad 6 cm. longae, in paniculas grandes terminales dispositae; flores oppositi, alabastris glanduloso-pubescentibus; bracteae 3 mm. longae, late truncatae, apice parum retusae; bracteolae lineares, apice rotundatae. *Calyx* subaequaliter 5-fidus, 5 mm. longus, segmentis anguste linearibus vix 1 mm. latis ciliatis. *Corolla* alba, purpureo-suffusa, 3 cm. longa, ore 1 cm. diametro, inferne gradatim angustata, lobis rotundatis extra superne sparse pubescentibus intra glabris nisi lobi inferioris apicem versus. *Stamina* 2, filamentis complanatis glabris. *Ovarium* 7 mm. altum, pilis albis erectis dense coronatum. *Semina* ultra 2 mm. longa, 1·5 mm. lata, basi excepta pilis brevibus elasticis tecta.

Indo-China. Burma: Ruby Mines District; Bernardmyo to Mogok, 1850 m., *Lace* 6019.

XLII.—MIMOSA CAESIA AND M. INTSIA.

W. G. CRAIB.

The somewhat divergent views adopted with regard to these two Linnean species at different times by successive authors prompted the writer to an attempt to clear up the mystery surrounding them.

With *M. caesia* there seems to be practically no difficulty. Linnaeus based his species on Fl. Zeyl. 217, and of this there exist three specimens in Herb. Mus. Brit. which agree among themselves and which are identical with *Acacia Intsia*, Wight et Arn. In addition to the Fl. Zeyl. Linnaeus also quotes Plukenet. Unfortuately there does not appear to exist a specimen of Plukenet's plant, but from the figure the writer feels disposed to refer it, not to the Fl. Zeylanica plant but to the plant enumerated below as *Acacia torta*. According to Jackson there is a specimen written up as *caesia* in the Linnean herbarium, but not in Linnaeus's own handwriting. The writer proposes to limit *M. caesia* to Hermann's plant which is unquestionably the plant intended by Linnaeus.

Exactly which plant Linnaeus meant by his *M. Intsia* the writer has found impossible to decide. The first plant quoted by Linnaeus in his Sp. Pl., i. p. 522 is that of Hort. Cliff. 209. No trace of this particular Cliffortian plant was found in Herb. Mus. Brit., but a reference to the description reveals the fact that at least two plants are here involved. Linnaeus says concerning his plant "crescit in Madera et Malabaria et variis Americae partibus, unde semina omni anno nobis allata fuere." From this word sequence one might be justified in assuming that the Cliffortian plant was grown not from Indian but from American seed. If this were so, and since no species of this group of Acacia is common to India and America, we have here sufficient grounds for excluding the species from the Indian flora.

Further, Linnaeus in both the Hort. Cliff. and Sp. Pl. quotes references to two Indian plants, viz., Pluk. Alm., iv. t. 122 f. 2 and Rheede, Hort. Mal., vi. t. 4. The former figure shows what is, judging from the pods, an Acacia, but an examination of the

actual plant in Herb. Mus. Brit. proves that Plukenet's material consists of a barren shoot of *Mimosa rubricaulis* and detached fruits of an Acacia. What Rheede's plant is the writer cannot definitely say. But the size of the capitula, as also some minor points in the description, lead one to suspect that *Mimosa rubricaulis* was used, at least in part, for both description and figure.

A new reference—Gronovius—is added by Linnaeus in his Sp. Pl., *i.e.*, again he brings in an American plant.

Briefly, then, it may be stated that (1) of the two Indian references one is certainly to a mixture of an *Acacia* and a *Mimosa*, and the other, from which Linnaeus derived his specific epithet, to a figure for which the same *Mimosa* probably served at least in part, and (2) an American plant is involved by Linnaeus, and in all probability it was an American plant which Linnaeus had before him when describing the species.

With these two main conclusions in view the writer feels compelled to abolish the name *M. Intsia* altogether, at least so far as the Indian flora is concerned.

The writer regards the material examined by him, all of which has been referred to *Acacia caesia* and *A. Intsia*, as composed of at least six species. In the enumeration and description of new species which follows it will be noted that full synonymy is not given, the reason being that the species have been so mixed up that short of examining the actual specimens included under either or both species by successive authors, it has been found impossible to decide which particular plant is referred to.

ENUMERATION OF SPECIES WITH DESCRIPTION OF NEW SPECIES.

1. **Acacia Hoenackeri,** *Craib*, ab *A. caesia*, Willd., foliolorum costa basi valde obliqua haud centrali facile distinguenda.

Ramuli primo brevius glanduloso-pubescentes, mox glabri, cortice rubro-brunneo obtecti, aculeis brevibus rectis hic illic armati. *Folia* 6–10 cm. (petiolo communi 3–4 cm. longo excluso) longa; petiolus communis, primo glanduloso-puberulus, mox glaber, ut rhachis infra aculeatus, sulcatus, supra basem versus glandula oblonga fere 5 mm. longa sessili glabra et apicem versus glandula orbiculari vix 2 mm. diametro sessili glabra instructus; rhachis superne glandulis 2–4 sessilibus instructa; pinnae utrinque 6, circa 8 cm. longae, petiolo circa 5 mm. longo suffultae; foliola utrinque ad 20, oblonga, apice rotundata, basi truncata, valde inaequilateralia, saepius circa 1·2 cm. longa et 3·75 mm. lata, matura glabra, subtus pallidiora, nervis supra conspicuis subtus prominentibus, chartacea. *Capitula* 1 cm. diametro, et axillaria et in paniculam terminalem strictam disposita, pedunculo ad 4 cm. longo ut rhachi glanduloso-puberulo suffulta. *Calyx* 2 mm. longus. *Corolla* calyce duplo longior. *Ovarium* pubescens, stipite glabro suffultum.

South India. Nilghiris, Khundas Range, *Hohenacker* 1602 (Herb. Kew et Herb. Mus. Brit.).

2. **A. caesia,** *Willd.* *A. Intsia*, Wight et Arn., l.c. (quoad descr. et spec.). *Mimosa caesia*, Linn., Sp. Pl., p. 518 (quoad plantam zeylanicam).

India. *Roxburgh* (Herb. Kew, Mus. Brit. et Edin.). *Wight* 575 (Herb. Kew et Edin.), 578, K.D. 895 (Herb. Kew). *Koenig* (Herb. Mus. Brit.), Wall. Cat. 5248 A, B, C (pro parte). D. 5252 B (Herb. Kew). Madras Presidency; *Cleghorn* (Herb. Edin.), Cudappa, *Beddome* 2653, 2654, Anamalays, *Beddome* 2652 (Herb. Mus. Brit.). Hyderabad, *Campbell* (Herb. Edin.). United Provinces, Nawabganj, *Hamilton* 2375 (Herb. Edin.).

Ceylon. *Hermann* (Herb. Mus. Brit.—*type*).
Cult. Hort. Bot. Calc. (Herb. Edin.).

3. **Acacia oxyphylla,** *Graham* in Wall. Cat. 5252, quoad plantam sylhetensem tantum, nomen nudum; ab *A. caesia*, Willd., cui valde affinis, foliolis subtus inconspicue breviter adpresse pubescentibus, glandula petiolari haud obliqua, leguminibus latioribus facile distinguenda.

Ramuli primo crispatim pubescentes, mox glabri, pallide corticati, aculeis validiusculis recurvis armati. *Folia* 7-10 cm. longa, petiolo communi 4–5 cm. longo excluso; petiolus communis ut rhachis primo crispatim pubescens, demum plus minusve glabrescens, infra aculeatus, paulo supra basem glandula conspicua ornatus; rhachtis superne glandula solitaria (an semper solitaria?) instructa; pinnae utrinque 6-9, breviter petiolatae; foliola anguste oblonga, basi latere altero rotundata, altero cuneata, apice apiculo saepe recto saepe paulo prorsus diredto instructa, circa 1·2-1·3 cm. longa, 3·75 mm. lata, chartacea, supra glabra, subtus pallidiora et inconspicue sparse adpresse pubescentia, nervis supra conspicuis subtus prominulis. *Capitula* circa 1·2 cm. diametro, in paniculam terminalem foliatam disposita, pedunculo vix 2 cm. longo suffulta. *Calyx* 2·5 mm. longus. *Corolla* 3 mm. longa. *Ovarium* pubescens, stipite glabro suffultum. *Legumina* glabra, ad 15 cm. longa et 2 cm. lata.

Assam. *Jenkins* (Herb. Kew et Edin.), *Griffith* 526 (Herb. Kew); Sylhet, *De Silva et Gomez in Wall. Cat.* 5252 A; Cachar, *Hook. f. et Thoms.* (Herb. Kew).

3246?

4. **Acacia Gageana,** *Craib*, ab *A. caesia*, Willd., pinnis foliolisque multo numerosioribus facile distinguenda.

Ramuli juventute crispatim puberuli, pluri-sulcati, aculeis recurvis conspicuis vel fere deficientibus plus minusve in lineas dispositis armati. *Folia* ad 15 cm. longa (petiolo 5-7 cm. longo excluso); petioli ut ramuli crispatim puberuli, basem versus glandula parva orbiculari sessili instructi; rhachis superne glandulis sessilibus circa 3 ut glandula petiolari apice adpresse pubescentibus ornata; pinnae utrinque 8–11, circa 10 cm. longae, breviter petiolatae; foliola utrinque 30–40, conferta, anguste oblonga, apice rotundata et apiculo prorsus directo instructa, basi truncata, circiter 1·1 cm. longa et 2·27 mm. lata, charfacea, ciliata, subtus pallidiora, nervis supra conspicuis subtus prominulis. *Capitula* vix 1 cm. diametro, in paniculam grandem foliatam disposita, pedunculo communi circa 2 cm. longo suffulta. *Calyx* late cam-

panulatus, 1·5 mm. longus. *Corolla* 2·5 mm. longa. *Ovarium* stipite vix 1 mm. longo suffultum.

Sikkim. Lower Hills, J. D. Hooker (Herb. Kew—*type*); Sittong, 900 m., *Ribu et Rhomoo* (Herb. Edin.). N. Bengal, Alipur, *Hamilton* 2372 (Herb. Edin.). Assam. *Jenkins* 69 (Herb. Kew), *Jenkins*, sine num. (Herb. Edin.). Kumaon. Bagesar, c. 1050 m., *Strachey & Winterbottom* 4 (Herb. Kew). Kumaon or Garhwal, *Madden* 207 pro parte (Herb. Edin.).

5. **Acacia columnaris,** *Craib*, ab *A. caesia*, Willd., pinnis foliolisque numerosioribus, glandulis petiolaribus columnaribus distinguenda.

Ramuli primo tomentelli, sulcati, mox glabri, cinereo-corticati, aculeis circa 1–2 mm. longis rectis vel parum declinatis densius armati. *Folia* circa 8·5 cm. (petiolo communi vix 3 cm. longo excluso) longa; petioli communes primo crispatim puberuli, mox glabri, supra canaliculati, basem versus glandula 2 mm. alta instructi; rhachis glandulis columnaribus 3–4 superne ornata, indumento ut petioli instructa, subtus spinis decurvis armata; pinnae utrinque 8, 5–6 cm. longae, breviter petiolatae; foliola utrinque 10–17, oblonga, apiculo recto vel saepius parum prorsus directo instructa, basi truncata, ad 1·1 cm. longa et 3·5 mm. lata, chartacea, demum glabra, supra nitida, subtus pallidiora, opaca, nervis subtus prominentibus supra conspicuis, sessilia. *Capitula* circa 8 9 mm. diametro, in paniculam terminalem ferrugineo-tomentosam disposita, pedunculo communi circa 8 mm. longo suffulta. *Calycis* extra adpresse parce ferrugineo-pubescentis tubus 1·25 mm. longus, lobi 0·75 mm. longi, deltoidei, acuti. *Corolla* 2·5 mm. longa, dorso superne tenuiter adpresse ferrugineo-pubescens. *Stamina* corollam duplo superantia. *Ovarium* pubescens, stipite 1 mm. longo glabro suffultum, stylo glabro.

South India. S. Canara, near Mangalore, *Hohenacker* 1643 (*type*—Herb. Kew et Mus. Brit.). N. Canara, *Talbot* 622 (Herb. Dehra Dun). Mysore, Sagar, 600 m., *Meebold* 2658 (Herb. Edin.).

Ceylon (loco haud indicato) *Mrs. Col. Walker*, *Thwaites* 1619, pro parte (Herb. Kew).

6. **A. torta,** *Craib*, comb. nov. *A. caesia*, Wight et Arn., Prodr., p. 278, *non* Willd. *Mimosa torta*, Roxb., Fl. Ind., ii. p. 566 et icon ined. in Herb. Kew.

Bombay Presidency. *Gibson*, *Gethune*, *Dalzell* (Herb. Kew); Concan, *Stocks* (Herb. Kew et Mus. Brit.); near Mangalore, *Hohenacker* 609 a (Herb. Kew); Belgaum, *Ritchie*, 1737 (Herb. Kew et Edin.), 1737/3 (Herb. Kew). Madras Presidency. Jeddniroo near Vizeanagaram, *Cleghorn* 60 (Herb. Edin.); Naggur Hills, *Wight* K.D. 891 (Herb. Kew). Behar, *T. Thomson* 382 (Herb. Kew et Mus. Brit.), *Hook. f.* (Herb. Kew), Mongyr, *Hamilton* 2376 (Herb. Edin.), *Hamilton in Wall. Cat.* 5249 (Herb. Kew). Central Provinces, Pachmarhi, *Brandis* (Herb. Kew). Kumaon or Garhwal, *Madden* 207 pro parte (Herb. Edin.). N.W. India, *Stewart* 651 (Herb. Edin.).

XLIII.—MISCELLANEOUS NOTES.

Mr. J. R. Bovell.—We learn that Mr. J. R. Bovell, I.S.O., F.L.S., has resigned the Superintendentship of the Barbados Department of Agriculture, and has accepted the position of Agricultural Superintendent of important sugar estates in British Guiana.

Mr. Cyril Warren, lately a member of the gardening staff of the Royal Botanic Gardens, has been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, a Curator in the Agricultural Department of the Southern Provinces of Nigeria.

The Pagoda, Royal Gardens, Kew.—The Pagoda was built in 1761–2 to the design of Sir W. Chambers. As originally built, the main roof with the ornamental chains and hoops to the terminal pole were of copper, double gilded. The minor roofs were covered with highly-coloured iron plates, and ornamental dragons crouched at the hip terminals of the roofs. The dragons were in wood, and treated with highly-coloured enamels. These features existed up to about 1820. But the iron cover plates of minor roofs and the wooden dragons must have perished and been removed soon after, when the roofs were slated.

The severely straight lines of these roofs—now shorn of dragons and Eastern colour—was much lamented, and in 1845, when "an expensive scaffold had been erected round the Pagoda to paint the wood, etc., point the brickwork, and erect a new terminal pole," Sir W. J. Hooker suggested that it was a fitting opportunity to restore the original features of the Pagoda by fixing new "metal or glass" dragons to the angles of the roofs. This was supported by Mr. Decimus Burton, who, however, wished to improve on the original design. His sketch of the proposed alterations is still to be seen in No. 3 Museum. He suggested that in addition to restoring the dragons, the eaves should be curved up at the angles, and the roofs covered with copper, and that both roofs and brickwork should be painted to harmonise better with a Chinese structure. Projecting bells were to be hung at the hip terminals, and chains were to hang from the terminal pole to the eaves of main roof. But the estimated cost of £3,500 for these alterations made their execution impossible. Sir W. J. Hooker's suggestion to replace the dragons, and so restore the Pagoda to the original design was estimated to cost £850, and proved also too costly for acceptance.

Nothing daunted, he returned to the charge in 1856, renewing his suggestion of 1845 for the restoration of the dragons, etc., but they were again "postponed for another year," and so the Pagoda remains to this day.

On the occasion of executing the periodic painting and repairs at the Pagoda this summer—1915—investigation was made to discover the cause of so much rain coming through the roof and ceiling.

The roof generally was found to be covered with copper. It is in excellent condition, and shows no signs of disturbance or repair since its original construction. The pole and its flashing, however, were found to be so defective as to need renewing at once. Authority having been obtained for this, a careful survey was made with a view to seeing how the new pole could best be got into position. All the evidence obtained, both inside and out, went to show that the old pole, about 30 ft. long, had been got up by an outside scaffold and derrick, and dropped down through the hole made in the level table at the apex of the roof. But as all the painting at the various levels had been done from bracket or cantilever scaffolds, which are not adapted for, or high enough to get a pole up and into position from the outside, a plan was devised of getting the new pole up by a cantilever fixed on the top floor and passing through the window. By this the pole was hoisted through the window of the ninth floor, up through the staircase well, and through the ceiling trap door into position.

On taking down the old pole, a pencil note was found on the lower end, under the roof, recording that "this pole was erected by J. Wickens, August 1st, 18(?)7." A knot on the top of the third figure made this date very uncertain. But fortunately, on uncovering the table round the pole at the roof apex, two more records were found of the same character, with the definite date of 1867. This definitely fixes the date of erection of the pole just taken down.

A further interesting discovery was made of a cut-in date of August 20th, 1825, on the bed-plate on which the pole stands, and it is fairly certain that a new pole would be erected at the same time as the insertion of the bed-plate.

There is evidence, therefore, that the various terminal poles were erected at the following dates—when the Pagoda was new in 1762, and in August, 1825, June, 1845, August, 1867, and the last in September, 1915.

The "life" of these poles thus varies from 20 years upwards. It is more than probable, however, that the first pole did not last till 1825, but was renewed some time about the end of the 18th century. The present pole is therefore the fifth or sixth pole erected, and it is hoped that as this has been creosoted it will last longer than any of its predecessors. G. D. P.

Dendrobium Hookerianum with fringed petals.—A curious peloriate form of *Dendrobium Hookerianum*, Lindl., has been sent to Kew by Mr. J. Gurney Fowler, Brackenhurst, Pembury, in which the petals are enlarged to twice their normal breadth and deeply fringed, as in the lip. The condition seems to be permanent, for all the flowers are alike, as was also the case last year, when it was recorded under the name of *D. Hookerianum*, Fowler's variety (*Gard. Chron.* 1914, ser. 3, lvi. p. 200). The cause of the peculiarity is not apparent, for the flowers are normal in other respects. In one petal, however, of the four-flowered inflorescence there is a narrow maroon-coloured streak on one side of the basal half, which occupies the same position as the

maroon-coloured blotch on the lip of the normal form of the species, which is figured at t. 6013 of the *Botanical Magazine*. In the allied species, *D. fimbriatum*, Hook., and *D. Brymerianum*, Reichb. f., the lip is normally fringed, but in *D. Harveyanum*, Reichb. f., the petals as well as the lip are normally fringed, though in other respects the species is very distinct from the abnormal variety now under notice. A plant was exhibited at the meeting of the Royal Horticultural Society held on September 14th last, together with one of the normal form for comparison.

R. A. R.

Botanical Magazine for October.—The plants figured are *Pyrus yunnanensis*, Franch. (t. 8629); *Gentiana gracilipes*, Turrill (t. 8630); *Promenaea microptera*, Reichb. f. (t. 8631); *Streptocarpus denticulata*, Turrill (t. 8632) and *Clematis unicata*, Champion ex Benth. forma *retusa*, Sprague (t. 8633).

The Pyrus is a handsome tree belonging to the section *Eriolobus*, which Roemer considered a separate genus. *P. Tschonoskii*, Maxim., from Japan, and *P. trilobata*, DC., from Syria, also belong to this section. This group differs from the *Aria* group in which Franchet placed *P. yunnanensis* by the styles being united for their lower third, or more, and it is distinguished from *Malus* by the grit-cells in the flesh of the fruit. The plant figured was raised from seed sent to Coombe Wood, collected by Mr. E. H. Wilson in the district of Chang-yang, Western China, and was purchased from Messrs. Veitch for the Kew Collection in 1913. This species was originally discovered by Delavay in Yunnan.

We are indebted to Mr. H. J. Elwes for the material of the interesting Chinese gentian *G. gracilipes*, which was raised at Colesborne from seed collected in Kansu and received through the late Mr. R. Woodward. This species belongs to the section *aptera* of Kusnezow, and is nearly allied both to *G. dahurica*, Fisch., and *G. Fetisowii*, Maxim. With the former it agrees closely, but differs in its longer pedicels and spathaceously divided calyx, in which latter character it approaches *G. Fetisowii*.

Promenaea microptera is an interesting little orchid, included among those presented by the Dowager Lady Lawrence to Kew. It was described in 1881 by Reichenbach, but its exact habitat is uncertain. The nearest ally to the species is *P. xanthina*, Lindl., from Brazil, but the genus also occurs in Guiana and Colombia. *Promenaea* was founded as a genus by Lindley, and after having been merged in *Zygopetalum* by Reichenbach, was restored later by him to generic rank.

The *Streptocarpus* belongs to the section *Unifoliatae*, of the genus of which some 15 species are known from South Africa. *S. denticulata* is a native of the Transvaal, and the seed was collected by Mr. J. N. Thorncroft on a mountain near Barberton. It is allied to *S. pusilla*, C. B. Clarke, but differs in having glabrous leaves and short-tubed flowers. The rose-purple flowers are very distinctive.

The striking form of *Clematis uncinata* differs from the type plant in its leafy inflorescence and in having its leaflets retuse at

the apex. The material for the plate was supplied by Capt. D. V. Pirie from his garden at the Château de Varennes, near Angers, where it forms a charming picture clambering over an old grey wall.

Cotoneaster wood for Golf Clubs.—In a letter recently received from Sir Herbert Maxwell, he sends the following interesting information as to the value of the wood of *Cotoneaster frigida* for making the heads of golf clubs:—

> "When I began golf 50 years ago, it was considered that crab was the only wood fit for making into club heads. The rapid spread of golf all over the world soon used up the available supply of crab, so the makers took to beech. Beech was apt to snap at the neck of the club and was abandoned for persimmon, which, I believe, is now used almost exclusively.
>
> "I know not what the world's resources in persimmon may be, but two years ago, having occasion to remove a large *Cotoneaster frigida*, I thought the wood likely to prove as good as persimmon. I therefore sent some chunks of it to Charlie Hunter, the father of golf at Prestwick, and when I was there a few weeks ago, he presented me with a very pretty club made of the *Cotoneaster*. He says the wood is most suitable. There is no difficulty in growing any quantity of it, for it sows itself freely, but requires about 40 years' growth to produce timber of suitable size."

It is also probable that the wood of *Cotoneaster bacillaris* may be found suitable for making club heads. It grows freely in this country, forming stems several inches in diameter. Gamble "A Manual of Indian Timbers," p. 326, says of this species: "Weight on an average 57 lbs. per cubic foot. The wood is used for making walking-sticks. The alpenstocks used throughout the West Himalaya are usually made of it. Aitchison says that in the Kuran Valley it forms a great part of the scrub within the hills at 7-8000 ft., and is largely in request for agricultural implements, staves and bows."

Flora of the Upper Gangetic Plain.—The first part of volume III. of Mr. Duthie's work has recently been published. It contains the *Monochlamydeae* from *Nyctaginaceae* to *Ceratophyllaceae*, and comprises 168 pages.

The *Nyctaginaceae* are represented by 3 species of *Boerhaavia*; *Amarantaceae* by 9 genera, 18 species; *Chenopodiaceae*, 5 genera, 7 species; *Polygonaceae*, 2 genera, 17 species; *Aristolochiaceae*, 1 species; *Piperaceae*, 2 genera, 2 species; *Lauraceae*, 6 genera, 10 species; *Elaeagnaceae*, 1 species; *Loranthaceae*, 2 genera, 7 species; *Santalaceae*, 1 species; *Euphorbiaceae*, 21 genera, 51 species; *Urticaceae*, 17 genera, 44 species, 18 of which are *Ficus*. *Casuarinaceae*, 1 cultivated species; *Cupuliferae*, 1 *Quercus*; *Salicaceae*, 2 species, and *Ceratophyllaceae*, 1 species. In addition to the above, Mr. Duthie gives useful descriptive notes on all the introduced and cultivated species of the families dealt with.

J. H.

Materials for a Flora of the Malayan Peninsula.—Since our notice of No. 21 of this work (*K. B.* 1909, p. 159), which marked the conclusion of the account of the *Gamopetalae*, four parts, Nos. 22–25, dealing with most of the *Monochlamydeae* have been published.

Part 22 appeared in 1912 and dealt with the families *Nyctaginaceae*, *Amarantaceae*, *Polygonaceae*, *Aristolochiaceae*, *Chloranthaceae*, *Lauraceae* and *Hernandiaceae*, all the work of Mr. Gamble, with the exception of the *Polygonaceae* by Major Gage. The *Nyctaginaceae* are represented by a single species, *Boerhaavia diffusa*, L. The number of species of *Amarantaceae* is 14, distributed under 10 genera; *Polygonaceae*, 8 species of *Polygonum*; *Aristolochiaceae*, 8 species under 3 genera; *Chloranthaceae*, 2 species of *Chloranthus*. The *Lauraceae*, which occupy the major portion of the part, are very abundant, with 171 species distributed under 16 genera; there are no less than 55 species of the genus *Litsea*. *Hernandiaceae* is represented by 1 species of *Hernandia*, the genera *Illigera* and *Gyrocarpus* having been included in an earlier volume under *Combretaceae*.

Part 23, also published in 1912, contains Mr. Gamble's account of the families *Myristicaceae*, 4 genera and 46 species; *Monimiaceae*, 2 genera and 7 species; *Thymelaeaceae*, 5 genera and 8 species; *Gonystylaceae*, 1 species of *Gonystylus*; *Elaeagnaceae*, 1 *Elaeagnus*; *Santalaceae*, 2 genera and 9 species; and the genus *Champereia*, Griff., which, according to Engler and Prantl, should have been included in the *Olacaceae*.

Part 24 appeared in 1914, and deals with *Nepenthaceae*, 10 species of *Nepenthes*, by Dr. J. M. Macfarlane; *Piperaceae*, 2 genera and 78 species, by M. C. De Candolle; *Proteaceae*, 9 species of *Helicia*, and *Loranthaceae*, 8 genera and 44 species, by Mr. Gamble.

Part 25, recently published, contains the families *Cytinaceae*, 2 genera, each with a single species, and *Balanophoraceae*, 2 genera and 6 species, by Mr. H. N. Ridley, together with the following by Mr. Gamble: *Juglandaceae*, 1 genus with 3 species; *Myricaceae*, 1 species of *Myrica*; *Casuarinaceae*, 1 *Casuarina*; *Fagaceae*, 3 genera with 51 species, and *Salicaceae*, 1 *Salix*. In regard to the genera of *Fagaceae*, Mr. Gamble has followed with slight modifications the classification proposed by Prantl in Engler and Prantl, Die Natürlichen Pflanzenfamilien. The genus *Quercus*, as thus restricted, is represented by only 3 species, whilst the remainder of the Oaks described from the Peninsula by Sir G. King in his monograph and subsequently by Sir J. D. Hooker in the Flora of British India are referred to the genus *Pasania* with 35 species.

With the elaboration of the *Euphorbiaceae*, *Urticaceae*, and *Gymnosperms*, the "Materials" will be completed, the *Monocotyledons* comprising the sixth volume having formed the subject of a separate publication entitled "Materials for a Flora of the Malay Peninsula—Monocotyledons," by H. N. Ridley (Methodist Publishing House, Singapore, 1907–8). J. H.

Flora of Aden.*—The second part of the Rev. Father Blatter's interesting work has now appeared. Part I., published last year, is devoted to (1) a history of botanical exporation in Aden, (2) physical aspects of the district, and (3) a general account of the vegetation. Accompanying it is an excellent large scale map and five reproductions of photographs showing general views of the town and harbour. The majority of collectors of Aden plants have been travellers on their way to India or East Africa, who were unable to spend more than a few hours at the port. Continuous collecting by a resident during the whole year would perhaps yield further interesting results.

Part II. contains the bulk of the systematic account; it includes (1) a synopsis of the natural orders, which are arranged from *Ranunculaceae* to the end of *Urticaceae*, after Bentham and Hooker's Genera Plantarum, and (2) descriptions of the families, genera and species, with keys to the two last mentioned. We learn from the preface that the descriptions are not wholly the work of the author, but have mostly been adapted from botanical works dealing with neighbouring countries. The number of indigenous species is 250, distributed under 138 genera. Of these, 47 species are *Monocotyledons*. The largest family is *Gramineae* with 33 species, *Leguminosae* has 32, *Capparidaceae* 18, *Euphorbiaceae* 13, *Boraginaceae* and *Chenopodiaceae* 11 each, *Compositae* 10, *Scrophulariaceae* 9, whilst most of the other families are represented by one or two species. No less than 19 families claim only a single species, and Father Blatter considers that this paucity is due to the excessive heat and drought which tend towards the entire extinction of vegetable life.

Father Blatter's publication is a valuable contribution to our knowledge of the vegetation of Southern Arabia.

* Records of the Botanical Survey of India, vol. vii.—Nos. 1 and 2 (1914–15): Flora of Aden, by Ethelbert Blatter, S.J., F.L.S.—Calcutta, Superintendent Government Printing, India.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 10] [1915

XLIV.—JOHN MEDLEY WOOD.

1827–1915.

We regret to record the death of Dr. John Medley Wood, A.L.S., late Director of the Natal Herbarium, Durban, Natal, on August 26th last, at the ripe age of 87 years and 8 months.

Dr. Wood was an old and valued correspondent of the Royal Botanic Gardens, Kew, which he enriched with many living and dried plants, and it is to his efforts more than to those of any other single collector that so much is known of the Flora of Natal. His loss will be felt not alone by Kew, but also by many other botanical establishments throughout the world.

He was born at Mansfield, Nottinghamshire, on December 1st, 1827, in the reign of George IV., and has therefore lived under the rule of five Sovereigns. He was the son of Mr. James Riddall Wood, at that time a naval officer, and in due course became so enamoured of the sea that he joined the East Indian merchant service, in which he attained to the rank of chief officer. Although a sailor, he was in London only once in his life. In a letter to the writer received in 1900 he said: "I think it was in 1850 I reached London from the Chincha Islands in the good ship *Cordelia*, of which I was second officer; we discharged cargo in the West India Dock and left again for Liverpool. During the time I was there I only left the dock once, that was on a Sunday morning, to take a young lad to meet his father at an hotel in (I think) Newgate Street. I found the place and then returned to the ship, so I did not see much of what Cobbett called the "Great Wen," and after 50 years in quiet Natal I do not think I should feel at all at home in such a busy place." He also mentions that his ship, the *Cordelia*, was in the Hoogly when Sir Joseph Hooker went to India with Lord Dalhousie, and he saw the party land. After nearly seven years of the sea, he went to Natal, arriving at Durban on May 4th, 1852, where he joined his father, who had also left the sea, and was then practising as a solicitor, and who was the first deputy sheriff in Natal. Upon arrival, after tramping for some distance the sand and bush that at that period formed the coast region, Wood said he was not going

(4181.) Wt. 153–601. 1,125. 12/15. J. T. & S. G. 14.

any further, and wanted to know how far it was to Durban. His companion replied that they were then at the corner of the Market Square and that a house near by was his father's office. Next morning he got up very early and walked about the sandy neighbourhood "looking for the houses" as he expressed it. While thus occupied he was seen by his mother who expressed herself as horrified that he should parade the middle of the town in his sleeping costume! Such was Durban at that period.

In the early part of his career in Natal, Dr. Wood traded with Zululand, and turned his attention to farming and the cultivation of crops suitable to the climate. From boyhood, botany had always been a favourite hobby with him, and this probably brought him in touch with Mr. McKen, the former curator of the Botanic Garden at Durban, who subsequently married his sister. Upon the death of his father, Medley Wood went to Inanda and took up stock farming. It was whilst there that in September, 1875, he first entered into correspondence with Kew and from that time until his death never ceased making valuable contributions of specimens to the Herbarium and living plants to the Gardens.

During his residence at Inanda, the Zulu War occurred, and upon hearing of the defeat at Isandhlwana, Medley Wood and others living in the vicinity removed with their wives and families to Verulam, where, as a member of the Town Guard, he prepared to help in defending the place with a small ship's carronade he had surreptitiously brought from Durban, as no one there claimed it, and for which he made the cartridges with his own hands. Fortunately Verulam was never in danger of an attack by the Zulus.

On March 1st, 1882, he was appointed Curator of the Botanic Gardens at Durban, of which he subsequently became Director, and when the Gardens were separated from the Herbarium and placed directly under the management of the Corporation, Wood remained Director of the Natal Herbarium. In the early part of his Curatorship he learned that some plants of the "Uba" cane* had lain unclaimed at the Customs House for a considerable time. All but a few were dead, but those that showed life he obtained permission to remove, and managed to coax two of them to grow into healthy plants. These were given to

---

* The correct name of this cane is unknown, the name "Uba" represents the only letters decipherable on the damaged label attached to this variety on its arrival in the country. Mr. Medley Wood thought that the plants were introduced by Governor Charles Mitchell on his return from a visit to India in 1884–85. The cane is now very generally cultivated in Natal, *see* Natal Agricultural Journal, Vol. viii, No. 3, 1905, p. 225. This word "Uba" may be part of the name "boubaya" applied to one of the Madagascar canes introduced to the Mauritius Botanic Garden by Dr. J. V. Thomson in 1815. This name may have found its way to India from Mauritius along with the canes sent by Captain Dick in 1827 to the Calcutta Botanic Gardens on behalf of Captain Sleeman. From cuttings of the canes, planted by Sleeman at Jubbulpur, the cultivation of Mauritius canes gradually became established in the Deccan, and had reached Bombay in 1838. But if the presence of the word "Uba" in Natal be due to the survival of the name "boubaya" in India that name must now connote a cane unlike the one to which it was originally applied. According to Thomson "boubaya," resembled an Otaheite cane.

a planter, and thus the establishment of the Uba cane in Natal is due to Dr. Wood. The Elephant cane he received from Kew in 1884 and at once distributed to the planters of Victoria and Alexandra. The organisation, building up and arranging of the fine Herbarium Durban possesses, must also mainly be placed to his credit, as before he took charge of it the collection was of a most unpretentious kind. Besides his official duties and the work of the Herbarium he found time to write the descriptions and superintend the plates of "Natal Plants," a fine work in six volumes, illustrating no less than 600 of the native plants of Natal which will remain a lasting monument of his botanical activities. At the time of his death he was at work upon another volume of this work, of which he wrote under date of August 3rd, 1915, that 72 of the plates and descriptions for volume 7 were ready. He also wrote a "Guide to the Trees and Shrubs of the Natal Garden," a "Handbook to the Flora of Natal," and a "Revised List of the Flora of Natal."

His end was very sudden, for although during the last few years of his life he was occasionally troubled with bronchitis and other passing ailments, yet on the whole he had fair health, and only the day before he died he had been busy preparing descriptions for "Natal Plants" and retired to rest apparently in good health; the next morning (August 26th) he awoke with a pain in his side, and died before help could arrive.

He was an ardent lover of cricket and football, and was president of one of the local football clubs. He was keenly interested in all their doings, and many of his letters contained allusions to these sports in some way; often also he wrote some amusing anecdote connected with his life, for he had a keen sense of humour. On one occasion he informed the writer that during the preliminaries for the transfer of the Gardens to the Corporation, some Dutchmen connected with the matter came to visit the Herbarium and were very much puzzled and astonished at what he showed them. They had expected it to be a place where "herbs for cooking and medicinal purposes were grown," and had no appreciation for the collection of dried plants, useless as it seemed to them.

In the spring of 1913 the degree of Doctor of Science was conferred on him by the University of the Cape of Good Hope—a well-merited distinction which gave great pleasure to his many botanical friends.

N. E. Brown.

XLV.—CONTRIBUTIONS TO THE FLORA OF SIAM.

Additamentum VIII.

Naravelia siamensis, *Craib* [Ranunculaceae-Clematideae]: a *N. zeylanica*, DC., foliolis fere omnino glabris, petalis longioribus recedit.

Ramuli circiter 3·5 mm. diametro, sulcati, pilis albis nitidis brevibus puberuli, cortice brunnescente obtecti. *Foliola* duo, matura late ovata vel elliptico-ovata, juniora lanceolato-ovata,

apice mucronulata, usque ad 14 cm. longa et 10 cm. lata, papyracea, pagina utraque glabra nisi costa nervisque pilis brevibus perpaucis hic illic instructa, fere e basi 3–5-nervia, nervis supra conspicuis subtus prominentibus, nervis transversis satis distantibus pagina utraque conspicuis, nervulis uti reticulatione vix gracili sub oculo armato subconspicuis, margine integro parum revoluto pauperrime ciliata; petioli ad 7·5 cm. longi, sulcati, mox glabri; petioluli circiter 1·5 cm. longi; cirrhi usque ad 12 cm. longi, apice trifidi, cito glabri. *Paniculae* axillares, pyramidali-oblongae, 15–17 cm. longae, pedunculo communi usque ad 6 cm. longo sulcato puberulo suffultae: ramuli omnes recto, puberuli, sulcati, infimi 5–7-flori, 5 cm. longi, pedunculo 2 cm. longo suffulti, mediani 3–5-flori, supremi uniflori; bracteae infimae foliaceae, foliis similes nisi multo minores vel simplices et 1·5 cm. longae, ceterae filiformes; pedicelli plerumque circiter 1·5 cm. longi, quam ramuli densius puberuli. *Sepala* cito decidua, 6–7 mm. longa, dorso pilis perpaucis adpressis instructa, margine dense tomentello-ciliata. *Petala* 1 cm. longa, superne grădatim incrassata, basi parum complanata. *Stamina* paulo ultra 3 mm. longa, filamento complanato, connectivo excurrente.

Chiengmai, Doi Sutep, in scrub jungle, 330 m., *Kerr* 1527 *b*.

Clematis siamensis, *Drummond et Craib* [Ranunculaceae-Clematideae]: a *C. sikkimensi* (Hook. f. et Th. pro var. *C. acuminatae*, DC.), cui affinis, alabastris longioribus obtuse acuminatis recedit.

Ramuli graciles, primo parce pilosi, cito glabri nisi ad nodos diutius puberuli, juventute pallide virides, mox brunnei vel fusco-brunnei, conspicue pluri-sulcati. *Folia* trifoliolata, petiolo communi 3–9·5 cm. longo juventute puberulo et supra distincte canaliculato mox inferne subglabro superne puberulo haud alte canaliculato interdumve subtereto suffulta; foliola ovato-lanceolata vel oblongo-ovata, apice longe acute acuminata, basi rotundata vel cuneato-rotundata, usque ad 13·5 cm. longa et 5·5 cm. lata, terminali lateralibus paulo majore, chartacea, glabra nisi supra costa nervisque pilis paucis brevibus subrigidis instructa, vix e basi 3-nervia, nervis ad apicem excurrentibus praetereaque nervis duobus inferioribus brevioribus haud tam conspicuis additis, nervis transversis subtus prominulis, argute distantius serrata; petioluli foliolorum lateralium ad 1·5 cm. longi, terminalium ad 3 cm. longi, omnes supra magis minusve canaliculati pilisque brevibus curvatis rigidis instructi. *Paniculae* axillares, petiolo breviores vel ei subaequilongae sed saepe folia duplo superantes, 3–9 vel multi-florae; pedunculus communis 0·8–3·3 cm. longus, ut rhachis parce pubescens et parum sulcatus; bracteae angustae, 5 mm. longae, parce pubescentes, apice penicellatae sed in paniculis elongatis superiores saepe foliis similes nisi parum minores; pedicelli graciles, plerumque 2–2·2 cm. longi, paulo infra medium parvi-bibracteolati; alabastra oblonga, superne conoidea, summo apice obtusa, ad 1·8 cm. longa, summo apice pubescente excepto glabra. *Sepala* oblongo-lanceolata, apice subobtusa, 2·3 cm. longa, basi 6 mm. lata, intus inferne glabra, superne puberula, margine densius

tomentello-ciliata. *Stamina* 1·6 cm. longa, filamentis complanatis pilis longissimis argenteis ciliatis, connectivo vix excurrente. *Pistilla* stamina aequantia: carpella parva, pubescentia; stylus basi pilis longis albis ornatus, superne glaber, nisi summo apice pilis paucis perbrevibus instructus.

Chiengmai, Doi Sutep, on bushes in evergreen jungle by stream, 1300 m., *Kerr* 3146.

Clematis Wattii, *Drummond et Craib* [Ranunculaceae-Clematideae]; a *C. Rehderiana*, Craib, foliolorum textura marginibusque, pedunculo multo breviore sepalorumque textura et forma recedit.

Ramuli usque ad 6 mm. diametro, sulcati, primo densius pilosi, mox crispatim pubescentes. *Folia* pinnatim 5-foliolata, petiolo communi 4–7 cm. longo indumento ut ramulis tecto suffulta; foliola ovata vel ovato-lanceolata, apice attenuata, acuta, basi late cuneata, truncata rotundatave usque ad 8·5 cm. longa et 5 cm. lata, rigide chartacea vel fere coriaceo-chartacea, supra pilis erectis rigidiusculis parce tecta, subtus mollius pubescentia, nervis nervulisque supra impressis subtus prominentibus, plus minusve obscure triloba, crasse irregulariter crenato-serrata, petiolulis 3 cm. vel ultra longis indumento ut rhachi ramulisque suffulta. *Inflorescentia* laxa, 3-9-flora, pedunculo communi ad 8 cm. longo indumento ut ramulis tecto suffulta; pedunculi partiales circiter 4·5 cm. longi; pedicelli ad 3·5 cm. longi; bracteae infimae foliaceae, usque ad 3·5 cm. longae; alabastra ambitu oblonga, superne conoidea, circiter 2·5 cm. alta et 9 mm. diametro. *Sepala* oblongo-lanceolata, breviter apiculato-acuminata, usque ad 2·6 cm. longa et 8 mm. lata, post anthesin pulchre revoluta, extra canescentia, intus inferne glabra, superne viliis paucis argenteis ornata. *Filamenta* circiter 1 cm. longa, inferne complanata, superne angustata, villosa, antheris apice truncatis vel retuso-truncatis duplo longiora. *Carpella* villis erectis argenteis longis obtecta, stylo gracili plumoso staminum subaequante. *Achaenia* castanea, laxius villosa, margine incrassata, circiter 4 mm. alta, stylo plumoso 3 cm. longo coronata.

Open grassy slopes rising to Doi Pah Khow, among tall grass, 1400 m., *Garrett* 115; Doi Chieng Dao, on low herbage, in open jungle, 1770 m., *Kerr* 2875.

Polyalthia obtusa, *Craib* [Anonaceae-Unoneae]: a *P. simiarum*, Benth. ex Hook. f. et Th., petalis longioribus, a *P. lateriflora*, King, ramulis juventute dense tomentellis, ab ambabus foliis apice rotundatis obtusisve rarissime breviter acuminatis et mucronulatis nequaquam longe acuminatis.

Arbor circiter 12-metralis (ex *Kerr*); ramuli primo dense tomentelli, cito puberuli et brunnei, mox glabri et cinereo-brunnei, cortice demum longitudinaliter reticulato haud lenticellato obtecti. *Folia* plerumque oblongo-elliptica vel fere elliptica, rarius oblongo-oblanceolata, apice rotundata obtusave, rarissime breviter acuminata et mucronata, basi cuneata vel rotundata, 10–21 cm. longa, 5·8–9·8 cm. lata, papyracea vel rigide papyracea, subtus parum pallidiora, pagina utraque primo

ad costam nervosque laterales densius puberula, mox superiore glabra, inferiore ad costam puberula et ad nervos laterales pilis paucis brevibus inconspicuis instructa, nervis lateralibus utrinsecus 14 15 intra marginem, praesertim superioribus, arcuatim junctis supra conspicuis subtus prominentibus, costa supra parum immersa subtus prominente, nervulis reticulationem gracilem supra subconspicuam formantibus; petiolus validus, circiter 5 mm. longus, puberulus. *Flores* gemini, e ramulis efoliosis orti; pedicelli graciles, 2·5–3·5 cm. longi, densius griseo-puberuli, saepius basem versus parvi-bracteolati. *Sepala* ovato-deltoidea, apice acuta vel subobtusa, 5 mm. longa, 4 mm. lata, margine revoluta, basi breviter connata. *Petala* ad 3·5 cm. longa, 6–8 mm. lata. *Stamina* vix 1·5 mm. longa. *Ovaria* paulo ultra 0·5 mm. alta, apice pilis paucis ornata, stylo distincto subglabro, stigmate puberulo. *Carpella* vix matura, 2 cm. longa, stipite ad 2·7 cm. longo suffulta; receptaculum depresso-convexum, usque ad 9 mm. altum et 1·7 cm. diametro; pedicelli lignosi, multo incrassati.

Lampang, Huc Mê Ta, mixed dry jungle, 360 m., *Kerr* 3189.

Mahonia siamensis, *Takeda* [Berberidaceae-Berberideae]: *M. flavidae*, Schneider, facie similis sed foliolo terminali basi haud cuneato, floribus majoribus et praesertim bacca globosa styloque longo differt.

Folia ad 45 cm. longa, 7–8-juga, jugo infimo stipulis valde approximato ejusque foliolis aliis 2–3-plo minoribus; petiolus basi dilatatus, stipulis subulatis ad 10 mm. longis subdeflexis praeditus; foliola lateralia inter se plus minusve approximata, lanceolata vel ovato-lanceolata, apicem versus sensim attenuata, nec cuspidato-acuminata, basi obliqua, cuneata vel subtruncata, firmissime coriacea, crassa, spinoso-denticulata, dentibus in latere inferiore 5-9, in superiore 4–8, pagina superiore nitida, nervis immersis, inferiore pallidiora, nervis venisque elevatis; foliolum terminale petiolulatum, aliis simile, basi subrotundatum. *Racemi* 6-10, fasciculati, densiflori, rhachi crassa sub anthesi 5–15 cm. longa et 2 mm. diametro demum elongata et incrassata fructifera robusta ad 30 cm. longa et 5 mm. diametro subterete; bracteae florum ovatae, acutae, 3 6 mm. longae, 2 4 mm. latae, scariosae; flores magni, pedicellis 0·5–1 cm. longis demum elongatis gracilibus suffulti. *Sepala* exteriora ovato-deltoidea, acutata, 2 mm. longa et lata, 5-nervia, mediana rotundato-ovata, obtusata, ad 4 mm. longa, 3 mm. lata, 7-nervia, interiora oblongo-elliptica, apice integra vel interdum leviter bifida, 8 mm. vel paulo ultra longa, 4·5 mm. lata, 7-nervia. *Petala* elliptica, apice biloba, 7·5 mm. longa, 4 mm. lata, basi nectariis duobus distinctis ornata, 5-nervia. *Stamina* petalis breviora, edentata, connectivo apiculato late triangulare, antheris quam filamentis brevioribus. *Ovarium* globoso-ovoideum, ovulis 4–6, stylo 2 mm. longo, stigmate capitato 1·5 mm. diametro. *Bacca* globosa, ad 5 mm. diametro, nigro-caerulea, pruinosa, stylo 2 mm. longo coronata, pedicellis strictis patentibus 0·7–1·2 cm. longis.—*Mahonia nepalensis*, Craib in Kew Bull. 1911, p. 11, *non* DC. *M. sp.*, Craib, Contrib. Fl. Siam in Aberd. Univ. Studies, No. 57, p. 10.

Chiengmai, Doi Sutep, evergreen jungle, 1500–1670 m., *Kerr* 1107, 1107A.

Distr. Burma: S. Shan States, Keng Tung, 1200 m., *Macgregor* 1236 (Herb. Calc.).

Schima brevipes, *Craib* [Ternstroemiaceae-Gordonieae]; a speciebus aliis pedicello brevi facile distinguenda.

Ramuli primo adpresse pubescentes, mox puberuli, demum glabri, cortice rubro-brunneo conspicue multi-lenticellato obtecti. *Folia* oblongo-lanceolata, ovato-lanceolata vel oblongo-obovata, apice acuta, basi cuneata vel late cuneata, usque ad 13 cm. longa et 5·1 cm. lata, mox coriacea, pagina superiore glabra, inferiore primo sericea, mox breviter pubescentia, nervis lateralibus utrinque 10–11 supra conspicuis subtus prominentibus, reticulatione pagina utraque conspicua; petioli 10–17 mm. longi. *Calyx* infructescens circiter 7 mm. diametro, dorso glaber, intus sericeus. *Fructus* globosus vel leviter depresso-globosus, circiter 1·1 cm. altus et 1·3 cm. diametro, basi tenuiter sericeus, brunneus, pauci-lenticellatus, pedicello valido 1 cm. vix attingente suffultus. *Semina* transverse oblongo-reniformia, ala circiter 1 mm. lata inclusa 7·5 mm. longa, et 4 mm. lata.

Chiengmai, in deciduous jungle, 360 m., *Kerr* 2501.

Pentacme tomentosa, *Craib* [Dipterocarpaceae]; a speciebus aliis foliis bifacialiter pubescentibus recedit.

Arbor 8–10-metralis (ex *Kerr*); ramuli primo densius stellato-tomentosi, mox puberuli, demum glabri, cortice brunneo vel cinereo-brunneo obtecti. *Folia* oblonga vel oblongo-ovata, apice breviter vel brevissime acuminata, basi truncata, leviter cordata, usque ad 15 cm. longa et 8·7 cm. lata, papyracea, pagina utraque pilis stellatis superiore tenuioribus mollioribus inferiore ad costam nervosque laterales densius instructa, nervis lateralibus utrinque circiter 14 supra conspicuis subtus prominentibus ad marginem excurrentibus, nervis transversis satis numerosis subtus prominulis, ciliata, petiolo ut ramulis stellato-tomentoso circiter 3 cm. longo suffulta; stipulae mox deciduae, ad 1·5 cm. longae et 7 mm. latae, utrinque stellato-pubescentes. *Paniculae* e ramulis anni prioris ortae, ad 15 cm. longae, undique stellato-pubescentes; bracteae deciduae; pedicelli circiter 3 mm. longi. *Sepala* ad 1 cm. longa, ciliata, puberula. *Petala* 1·3 cm. longa, 1 cm. lata, ciliata, dorso superne parce pubescentia. *Filamenta* 2 mm. longa, antheris circiter 5 mm. longis.

Mê Maw, deciduous jungle, 300 m., *Kerr* 3184.

Decaschistia intermedia, *Craib* [Malvaceae-Hibisceae]: a *D. Harmandii*, Pierre et *D. parviflora*, Kurz, foliis supra glabris facile distinguenda.

Caules ad 40 cm. alti, pallide corticati, pilis brevibus rigidis stellatis scabridi. *Folia* inferiora oblonga, anguste oblonga rarissimeve oblongo-lanceolata, usque ad 6·8 cm. longa et 1·9 cm. lata, superiora linearia, usque ad 9·8 cm. longa, plerumque circiter 6 mm. lata, omnia apice mucronata, basi anguste cordata, satis rigida, pagina superiore omnino glabra, inferiore

deuse persistenter pallide stellato-tomentosa, nervis lateralibus utrinque numerosis intra marginem anastomosantibus infra prominulis supra cum nervis transversis pulchre reticulatis prominulis, costa supra immersa subtus prominente; petioli usque ad 1·1 cm. longi, indumento ut caulis instructi; stipulae fugaces, angustae, circiter 2 mm. longae. *Flores* punicei (ex *Kerr*), axillares, solitarii, sicco 6 cm. diametro, pedicellis circiter 3 mm. longis suffulti; bracteolae 10, angustae, acutae, circiter 4 mm. longae, dorso ut calyx pedicellique densius stellato-pubescentes. *Calyx* circiter 7 mm. longus, lobis 5 lanceolatis acutis, costa dorso valde prominente, nervo intramarginali conspicuo, intra adpresse pubescentibus. *Petala* dorso ad partes in alabastro exteriores parce stellato-pubescentia, 3 cm. longa, 1·5 cm. lata. *Stamina* 1 cm. longa, parte filamentorum libera ad 3 mm. longa. *Stylus* stamina 1 cm. superans, ramis 2 mm. longis.

Wang Chao, in savannah forest, 100 m., *Kerr* 3030.

Bombax Kerrii, *Craib* [Malvaceae-Bombaceae]; a *B. cambodiense*, Pierre, petiolis haud alte canaliculatis, nervis paucioribus, stylo glabro distinguendum.

Arbor circiter 12 m. alta (ex *Kerr*); ramuli validi, espinosi, primo tomentelli, mox glabri, cortice cinereo-brunneo vel cinereo reticulato-striato obtecti. *Folia* digitatim 5-foliolata, petiolo 4·5-10 cm. longo vix conspicue sulcato pilis brevibus stellatis deciduis tecto suffulta; foliola obovato-oblonga vel obvato-oblanceolata, apice breviter acuminata, mucronulata, basi cuneata vel acuminato-cuneata, usque ad 14·5 cm. longa et 6·3 cm. lata, coriacea, pagina superiore mox fere glabra, interdum fere scabriuscula, inferiore molliter brunneo-stellato-tomentosa, nervis lateralibus utrinque 9-12 supra conspicuis vel prominulis subtus prominentibus, reticulatione gracili sub oculo armato supra conspicua; petioluli 7-8 mm. longi, supra bisulcati. *Alabastra* obovoidea vel anguste obovoidea, apiculata, circiter 3 cm. longa et 2 cm. diametro, atra, glabra. *Calyx* floris expansi haud visus. *Petala* alba (ex *Kerr*), oblongo-oblanceolata, fere 8·5 cm. longa, 3·2 cm. lata, inferne praecipue ciliata, basi utrinque glabra, extra inferne longius sericea, intus superne albo-tomentella, inferne sericea. *Filamenta* basi in tubum 2 cm. longum connata, partibus liberis ad 5·5 cm. longis. *Ovarium* 6 mm. altum, dense brunneo-tomentosum; stylus 8·6 cm. longus, glaber.

Mûang Prao, mixed jungle, 390 m., *Kerr* 2838.

Lao name, Niu pa (ex *Kerr*).

Sterculia Kerrii, *Craib* [Sterculiaceae-Sterculieae]: a *S. colorata*, Roxb. ejusque affinioribus, calycis lobis angustis multo longioribus facile distinguenda.

Frutex 1·5-1·8 m. altus (ex *Kerr*); ramuli validi, primo stellato-tomentelli, mox glabri, cortice laevi plus minusve nitido fusco obtecti. *Folia* trilobata, ambitu oblonga vel rotundata, basi altius cordata, 10–18 cm. longa, 8–17·5 cm. lata, coriacea, pagina superiore nervis primariis et inferiore nervis primariis et transversis pilis stellatis brevibus parce instructa, nervis primariis (e basi ortis) 9–11 supra fere prominulis subtus valde promi-

nentibus nervis secondariis utrinque 3–4 subtus valde prominentibus; nervis transversis pagina superiore leviter immersis inferiore prominentibus; petioli 4–11 cm. longi, plus minusve breviter stellato-tomentelli. *Flores* ad ramulorum apices aggregati; alabastra pilis stellatis brunneis densis obtecta; bracteae fugaces, lineares, ad 7 mm. longae, stellato-tomentosae; pedicelli circiter 4 mm. longi, pilis stellatis pallidis dense tecti. *Fl.* ♂. *Calycis* albi (ex *Kerr* tubus cylindricus, 7 mm. longus et vix 5 mm. diametro, extra dense stellato-tomentosus, intus fauce lobi 5, lineares, acuti, 1·5 cm. longi, 3 mm. lati, intus glabri. *Androphorum* 2 cm. altum, validiusculum, omnino glabrum.

Doi Chieng Dao, on rocks at top of peak, 1770 m., *Kerr* 2866.

Hiptage glabrifolia, *Craib* [Malpighiaceae-Hireae]; a speciebus aliis floribus parvis, petalis cito deciduis distinguenda.

Frutex volubilis; ramuli graciles, teretes, glabri, cortice cinereo vel brunneo-cinereo lenticellato obtecti. *Folia* oblanceolata, oblongo-oblanceolata vel subelliptica, apice acuminata, obtusa vel subacuta, basi cuneata vel rotundato-cuneata, ad 10 cm. longa, 3·5 cm. lata, coriacea, glabra, subtus pallidiora, nervis lateralibus utrinsecus 5-7 intra marginem anastomosantibus supra conspicuis vel subobscuris subtus prominentibus, nervulis reticulationem subtus prominentem formantibus, margine integro cartaligineo fere ad basem glandula sessili latere utroque instructo; petioli ad 1 cm. longi, supra conspicue late canaliculati. *Inflorescentia* axillaris, racemiformis, ad 6 cm. longa, pedunculo communi petiolo breviore vel ei subaequilongo ut rhachi pedicellisque adpresse pubescente suffulta: pedunculi ultimi cum pedicellis 2·5 mm. longi; bracteae late ovatae, circa 1·5 mm. longae et latae. *Sepala* oblonga, apice rotundata, vix 2 mm. longa, pauci-ciliata, dorso glandula basi instructa. *Petala* cito decidua. *Stamen* inferius stylo longissimo fere aequilongum, ceteris sepalis subaequilongis. *Carpella* 3, infimo stylo circa 3 mm. longo evoluto, ceteris stylo perbrevi. *Fructus* ala maxima 1·9 cm. longa, 4·5 mm. lata, alae laterales 7 mm. longae, 3 mm. latae.

Mê Ping Rapids, Kêng Soi, evergreen jungle by river, 180 m., *Kerr* 2941.

Evodia parviflora, *Craib* [Rutaceae-Zanthoxyleae]; foliis 5–7-foliolatis, floribus minutis distinguenda.

Frutex, inflorescentia excepta glaber; ramuli primo pallide virides, mox brunnei vel cinereo-brunnei cinereive, teretes. *Folia* 5–7-foliolata, opposita, 5–10 cm. longa, petiolo communi simul ac rhachi supra canaliculato 1·5–5 cm. longo suffulta; foliola saepissime oblongo-elliptica vel anguste elliptica, apice acuminata, obtusa, basi cuneata vel rotundato-cuneata, 2·5–5 cm. longa, 1·2–2·5 cm. lata, chartacea vel rigide chartacea, nervis lateralibus utrinque 6–8 pagina utraque subconspicuis, nervulis subtus vix subconspicuis, margine serrata vel serrulata, petiolulo usque ad 6 mm. longo supra canaliculato suffulta. *Flores* virides (ex *Kerr*), parvi, in paniculas breves aggregati; bracteae inconspicuae, 0·75 mm. longae; pedicelli vix 1 cm. longi. *Sepala* transverse elliptico-oblonga, 1·25 mm. longa, 1·5 mm. lata,

minute ciliolata. *Petala* suboblonga, apice retusa, 1·25 mm. longa, 1 mm. lata. *Stamina* petalis paulo breviora, glabra. *Ovaria* 3, glabra, staminibus vix aequialta. *Discus* distinctus, margine crenulatus.

Doi Nang Keo, between Wieng Papao and Doi Săket, evergreen jungle, 960 m., *Kerr* 2527.

Gymnosporia obovata, *Craib* [Celastraceae-Celastreae]; a speciebus aliis foliis obovatis in ramulis brevibus fasciculatis, ovario bilocular recedit.

Frutex circiter 2 m. altus (ex *Kerr*); ramuli glabri, saepe plus minusve angulati, cortice rubro-brunneo reticulato-striato lenticellato obtecti. *Folia* obovata, apice rotundata, basi in petiolum attenuata, usque ad 5·9 cm. longa et 2·6 cm. lata, chartacea vel firme chartacea, glabra, nervis lateralibus utrinque circiter 6–7 subconspicuis, margine nisi inferne distanter serrulata; petioli plerumque 5–7 mm. longi, supra canaliculati, glabri. *Inflorescentiae* pluriflorae, foliis saepissime circiter dimidio breviores; bracteae bracteolaeque minutae; pedicelli graciles, usque ad 15 mm. longi, glabri. *Sepala* paulo ultra 1 mm. longa, sparse minute ciliolata. *Petala* 5, viridia (ex *Kerr*), oblonga, acuta, 3·5 mm. longa, 1·5 mm. lata. *Stamina* petalis breviora, glabra. *Discus* conspicuus, glaber. *Ovarium* disco vix 1 mm. altius, glabrum, stylo brevi, loculis duobus biovulatis. *Capsula* circiter 8 mm. alta, apiculata, bivalvis; semina fusco-brunnea, nitida, circiter 4 mm. longa et 2 mm. diametro, arillo circiter 1·5 mm. alto basi ornata.

Mê Ping Rapids: Hue Paka, on river bank, 150 m., *Kerr* 3047; Keng Um Lu, abundant on stony ground along edge of river, 200 m., *Kerr* 3047a.

Cissus Craibii, *Gagnepain* [Ampelidaceae]; ob folia alte lobata speciei nulli Asiaticae nisi *C. modeccoidi*, Planchon, affinis; ab hac indumento brevi ramulorum, petiolorum, foliorum, inflorescentiae ramorum et florium, calyce quadrato pubescente inter alia facile distinguenda.

Rami floriferi herbacei, sparse pilo-papillosi, nodosi, ad nodos articulati. *Folia* simplicia, basi cordata, 3–5-lobata, 6–11 cm. diametro, supra viridia, breviter pilosa, subtus pallida, reticulata, ad nervos pilosa, lobis palmatim dispositis oblongo vel lanceolato-acuminatis infimis minoribus usque ad 9 cm. longis ad medium 2–5 cm. latis; auriculae basales discretae, sinu rotundato; petiolus gracilis, 4–9 cm. longus, hirtellus, basi tumidus. *Inflorescentia* oppositifolia, umbellato-corymbosa, 2–3 cm. longa lataque, hirtella, pedunculo communi gracili 1 cm. longo, pedunculis specialibus tribus bifurcatis 5 mm. longis; pedicelli 2 mm. longi; flores virides (ex *Kerr*), in alabastro ovoidei, vix 2 mm. longi, hirtelli. *Calyx* quadratus, hirtellus, lobis vix prominentibus. *Petala* 4, cucullata, ab apice secedentia, extus pilosula, subhirtella. *Stamina* 4, filamentis stigma attingentibus, antheris suborbiculatis inter loculos haud gibbosis. *Discus* conspicuus, quadrangulus, undulatus, e basi usque ad ovarii medium coalitus. *Ovarium* in

stylum abrupte attenuatum, parte infima cylindrica, parte suprema (vel stylo) conica, stigmate terminal punctiformi; loculi biovulati, nucello haud provecto.

Foot of Mê Ping rapids, Ban Sămong, bamboo jungle, 135 m., *Kerr* 2181.

Tetrastigma quadrangulum, *Gagnep. et Craib* [Ampelidaceae]; ob ramos quadrangulares, stipulas magnas fragiles, ramulos stigmatiferos elongatos tenues distinctum; quoad flores ad *T. quadridentem*, Planchon, accedit sed ramis quadrangularibus, stigmate haud sessili recedit.

Frutex scandens; rami quadrangulares angusteve quadrialati, usque ad 5 mm. diametro, striati, glabri. *Folia* trifoliolata, petiolo communi obscure quadrangulari striato 5 cm. longo suffulta; stipulae fragiles, scariosae, amplexicaules, latae, in alas decurrentes, mox evanescentes; foliola elliptica, symmetrica, apice abrupte acuminata, calloso-mucronata, basi breviter attenuata obtusave, usque ad 12 cm. longa, 5–6 cm. lata, pagina utraque glaberrima, superiore viridia, inferiore paulo pallidiora, supra medium adpresse denticulata, dentibus apice calloso-mucronatis, costa subtus prominulente crassiuscula, nervis lateralibus utrinsecus 8–10 patulis dein arcuatis secus costam breviter decurrentibus, nervis ultimis rete densum subinconspicuum efformantibus; petioluli mediani 2·5–3 cm. longi, laterales 1 cm. longi. *Inflorescentia* axillaris, e perula plus minusve evidente assurgens, simpliciter umbellata, 2 cm. diametro; squamae basales ovatae, scariosae, fragiles; pedunculus communis 2 cm. longus, gracilis, glaber; pedicelli 6–11, filiformes, quadranguli, 7–8 mm. longi, glaberrimi, floribus ovato-truncatis 3·5 mm. longis papilloso-velutinis. *Sepala* 4, triangularia, obtusa, perbrevia, pilosula. *Petala* 4, triangularia, vix cornuta, apice evidenter inflexa, extus tenuiter villosa. *Stamina floris* feminei 4, filamentis ovario duplo minoribus, antheris abortivis. *Discus* angustissimus, subinconspicuus. *Ovarium ovoideum*, 1·5 mm. longum, apice in stylum attenuatum, glaberrimum; stylus ovario circa duplo minor, teres, stigmate coronatus; stigma 1 mm. diametro, 4-partitum, segmentis patentibus longiusculis sinuatis subulatis; ovula 4.

Chiengmai, Doi Sutep, evergreen jungle, 840 m., *Kerr* 1378.

Tetrastigma siamense, *Gagnep. et Craib* [Ampelidaceae]: ab affini *T. robusto*, Planchon, petiolis minus robustis, nervis lateralibus tenuioribus numerosioribus quam pagina haud pallidioribus, ramulis inflorescentiisque villosis, inter alia recedit.

Caulis inflatus, suberosus? mox complanatus (ex *Kerr*): ramuli primo rufo-villosi, dein glabrescentes, longitudinaliter striati. *Folia* pedatim 5-foliolata, petiolo robusto usque ad 9 cm. longo brevissime sparseque villoso suffulta; foliola ovato-lanceolata, apice obtusa, basi attenuato-obtusa, in lateralibus inaequaliter asymmetriceve attenuata, usque ad 12 cm. longa, 7–8 cm. lata, lateralibus minoribus, crassiuscula, glaberrima, utrinque pallida vel glaucescentia, laxe crenato-denticulata, dentibus prope sinum obtuse calloso-mucronatis, costa lata

crassiuscula, nervis lateralibus utrinsecus circa 10 tenuibus cum intermediis tenuissimis subinconspicuis; petioluli validi, supra planiusculi, sparse villosi. *Inflorescentia* axillaris, corymboso-umbellata, 3–4 cm. longa lataque, pedunculo communi valido circa 1·5–2 cm. longo ut pedunculis 3–5 secondariis circa 1 cm. longis breviter villoso suffulta; pedicelli 8–20, subverticillati, 3–4 mm. longi, apice incrassati, albido-villosi, floribus conicis apice truncato-corniculatis 3 mm. longis et basi 2·5 mm. diametro. *Sepala* 4, triangularia, perbrevia, pilosa. *Petala* 4, triangulari-cucullata, infra apicem dorso truncato-gibbosa, extra villoso-papillosa. *Stamina* (in floribus ♀) 4, subabortiva; filamenta ovario 2–3-plo breviora, antherae steriles, deminutae. *Discus* subinconspicuus, ad basem ovarium cingens. *Ovarium* conico-truncatum, glabrum, apice stigmaticum; stigma sessile, 4-partitum, partibus triangularibus crassiusculis patulis obliquisve; ovula 4.

Doi Din Deng, evergreen jungle, 630 m., *Kerr*, 2319.

2196

Dalbergia succirubra, *Gagnep. et Craib* [Leguminosae-Dalbergieae]; a *D. monosperma*, Dalz., foliolis haud glabris, ovario bi-ovulato, a *D. tamarindifolia*, Roxb., foliolis 7–17 tantum, et a *D. reclutina*, Benth., stipulis caducis, foliolis floribusque minoribus, ovarii stipite glaberrimo facile distinguenda.

Frutex scandens; rami juniores teretes, sinuati, dense pallide tomentosi, sicco rubescentes. *Folia* imparipinnata, 7–11 cm. longa, petiolo communi 4–8 cm. longo gracili tomentello suffulta; stipulae mox caducae; foliola 7–17, saepissime 15, elliptica, obtusissima, mucronulata, superiora gradatim crescentia, 1·5–3 cm. longa, 0·9–1·5 cm. lata, utrinque molliter pilosa, supra viridia, subtus pallida; nervi rete densum subtus subconspicuum efformantes; petioluli perbreves. *Inflorescentiae* axillares vel ramulos breves terminantes, 2–2·5 cm. longae lataeque, subcorymbosae, e basi ramosae, tomentosae; rami pluriflori, sat patuli, tomentosi; bracteae inter se 1–2 mm. distantes, subsecundae, squamiformes, persistentes, tomentosae; bracteolae persistentes, bracteis consimiles; flores densissimi, virides (ex *Kerr*), circa 6 mm. longi. *Calyx* campanulatus, extra tomentosus, dentibus 2 posticis latis obtusis, 3 anticis triangulari-acutis, mediano vix longiore. *Petala* longe unguiculata; vexillum orbiculare, obcordatum, basi magis minusve attenuatum truncatumve, 3 mm. diametro, abrupte retroversum; alae oblongae, ad unguem biauriculatae; carinae petala obtusa, semiorbicularia, basi auriculata. *Stamina* 10, monadelpha. *Ovarium* glabrum, biovulatum, stipite glaberrimo 2·5 mm. longo suffultum, stylo subulato.

Chiengmai, Doi Sutep, 990 m., *Kerr* 1682.

Eugenia ripicola, *Craib* [Myrtaceae-Myrteae]: foliis angustis oblanceolatis subcoriaceis nervis numerosis cum nervo intramarginali conspicuis distincta.

Frutex vel *arbuscula* ramulis glabris primo quadrangularibus mox teretibus cortice cinereo vel pallide brunneo-cinereo obtectis. *Folia* opposita, oblanceolata, apice acuminata, subacuta, basi

cuneata, ad 7·3 cm. longa et 1·8 cm. lata, subcoriacea, glabra, pellucido-punctata, costa supra saepius immersa subtus prominente, nervis lateralibus numerosis inter se parallelis pagina utraque conspicuis intra marginem anastomosantibus et ibi nervum intramarginalem continuum formantibus; petioli 3–5 mm. longi, glabri, supra canaliculati. *Inflorescentia* cymosa, glabra, pedunculo communi 0·7–fere 3 cm. longo suffulta; cymularum pedunculus 0·3–1·1 cm. longus; pedicelli 1 mm. haud attingentes. *Receptaculum* 3·5 mm. altum. *Sepala* decidua. *Petala* calyptratim decidua, 1·75 mm. longa, 2 mm. lata. *Stamina* longiora 5 mm. longa. *Stylus* vix 5 mm. longus; ovarium 1 mm. altum.

Mê Ping Rapids, Keng Soi, common along banks of rapids and in shallows, 180 m., *Kerr* 2944.

Sonerila Nisbetiana, *Craib* [Melastomaceae-Sonerileae]: species *S. tenerae,* Royle, facie similis sed antheris longis distinguenda.

Herba ad 5 cm. alta; caulis rubescens, erectus, simplex vel ramosus, setis divergentibus glanduloso-capitatis superne gradatim decrescentibus instructus. *Folia* plus minusve ovata vel lanceolata, mucronato-apiculata, basi cuneata vel late cuneata, usque ad 1·7 cm. longa et 9 mm. lata sed saepissime paulo breviora angustioraque, membranacea vel chartacea, pagina utraque setis satis longis sparse instructa vel glabra, e basi trinervata, nervis cum costa subtus prominulis, serrulata, petiolo brevi vel usque ad 3 mm. longo suffulta. *Inflorescentia* e floribus 1–5 constituta, caulem simplicem vel ramulos terminans; bracteae fugaces; pedicelli ad 5 mm. longi, sparse glanduloso-setosi. *Receptaculum* 4 mm. altum, 1·5 mm. diametro, setis glanduloso-capitatis parce instructum. *Sepala* late deltoidea, acute acuminata, 0·75 mm. longa, 1 mm. lata. *Petala* purpurea (ex *Kerr*), obovata, breviter vix distincte unguiculata, 3·5–4 longa, 2·75 mm. lata. *Filamenta* inferne complanata, 3 mm. longa, antheris arcuatis 4 mm. longis.

Chiengmai, Doi Sutep, deciduous jungle, 330 m., *Kerr* 1549B.

Homalium (Racoubea) Damrongianum, *Craib* [Samydaceae]; ab *H. dictyoneuro,* Warb., bracteis conspicue minoribus recedit.

Arbor 20–25 m. alta (ex *Kerr*), inflorescentia excepta glabra; ramuli ad 3 mm. diametro, primo rubro-brunnei, pauci-lenticellati, mox cinereo-brunnei. *Folia* oblonga, apice acuminata, obtusa, basi cuneata, 10–15·5 cm. longa, 2·5–4·9 cm. lata, firme chartacea, sicco viridia supra subnitida, subtus pallidiora, nervis lateralibus utrinque 7–10 supra prominulis subtus prominentibus, nervis transversis uti reticulatione gracili pagina superiore subpromitnulis inferiore prominulis, margine cartilagineo glandulis impressis inter se satis distantibus regulariter instructa, petiolo circiter 1 cm. longo supra canaliculato suffulta. *Racemi* axillares, foliis subaequilongi, pedunculo communi circiter 3 cm. longo fere glabro suffulti, rhachi puberula; bracteae anguste oblongae, obtusae, 2·5 mm. longae, fere 1·5 mm. latae, dorso breviter pubescentes, ciliatae; pedicelli brevissimi vel usque ad 3 mm. longi, apice bracteolis duabus bracteis similibus nisi minoribus ornati. *Calycis* segmenta oblanceolata, acuta, 6 mm.

longa, 2 mm. lata, utrinque breviter pubescentia, ciliolata. *Petala* alba (ex *Kerr*), anguste deltoidea, calycis segmentis subaequilonga, utrinque breviter pubescentia. *Filamenta* pilis paucis divaricatis instructa. *Disci* lobi petalis isomeri, densius griseo-puberuli. *Ovarium* circiter 3·5 mm. altum, 4–5-angulatum, pubescens; styli 4–5, circiter 1 mm. longi, apice glabri, stellatim dispositi.

Near Pang Pue, Pa Hin, by stream, 400 m., *Kerr* 3168.

Tarenna Collinsae, *Craib* [Rubiaceae–Gardenieae]; a *T. attenuata* (Webera attenuata, *Hook. f.*), corollae tubo breviore distinguenda.

Ramuli glabri, juventute fusci, mox cinerei, plus minusve complanati. *Folia* oblongo-obovata, rarissime subelliptica, apice acuminata, acutiuscula, basi cuneata rariusve acuminato-cuneata, usque ad 11 cm. longa et 5 cm. lata, chartacea, sicco nigra, omnino glabra, nervis lateralibus utrinque circiter 10 pagina utraque conspicuis vel subconspicuis, nervis transversis omnino vel fere omnino obscuris, petiolo usque ad 14 mm. longo supra haud altius canaliculato glabro suffulta; stipulae inter se connatae, subulato-acuminatae, dorso magis minusve carinatae, 5–6 mm. longae. *Corymbi* sessiles vel breviter pedunculati, 3 cm. longi et 4 cm. diametro, rhachi pedunculis et pedicellis puberulis; pedicelli vix ultra 1 mm. longi; bracteae et bracteolae parvae. *Receptaculum* calyci subaequilongum, circa 1 mm. altum, puberulum. *Calyx* extra puberulus, lobis 0·5 mm. longis fere 1 mm. latis acutis vel subacutis dorso superne plus minusve carinatis intus pilis perpaucis brevibus adpressis instructis. *Corollae* tubus 1 mm. longus, ore anulo denso pilorum instructus, lobi oblongi. 3 mm. longi, 3·5 mm. lati, imbricati, haud ciliati, extra glabri, intus medio inferne pilosi. *Antherae* lineares, 6·75 mm. longae, filamentis circa 1 mm. longis. *Ovarii* loculi uniovulati; stylus 1 cm. longus, circa 2 mm. e basi anulo satis lato pilorum ornatus.

Sriracha, near beach, *Mrs. D. J. Collins* 120.

Tarenna pauciflora, *Craib* [Rubiaceae-Gardenieae]; inflorescentia laxe pauciflora distinguenda.

Frutex circiter 3-metralis (ex *Kerr*), inflorescentia excepta glaber; ramuli graciles, cinereo-corticati, parum compressi. *Folia* oblanceolata, obovato-oblanceolata vel fere elliptico-obovata, apice acuminata, acuta, basi cuneata, 4–12 cm. longa, 1·5–5·5 cm. lata, chartacea, sicco nigrescentia, nervis lateralibus utrinque 6 intra marginem anastomosantibus supra conspicuis subtus parum prominentibus, nervis transversis paucis supra interdum conspicuis subtus subprominulis, petiolo 0·3–1 cm. longo supra parum canaliculato suffulta; stipulae connatae, deltoideae, acutae, vix 5 mm. longae, mox stramineae. *Inflorescentia* e cymis corymbosim dispositis constituta, laxa, circiter 3 cm. longa et 4 cm. diametro; bracteae bracteolaeque parvae; pedicelli circiter 2 mm. longi, ut pedunculi sparse bifacialiter breviter pubescentes. *Receptaculum* 0·75 mm. altum, parcissime pubescens. *Calyx* extra ut receptaculum parcissime pubescens; tubus

0·5 mm. longus; lobi paulo ultra 0·5 mm. longi, fere 1 mm lati, breviter acuminati, dorso superne subcarinati, intus ut tubus adpresse setulosi, ciliolati. *Corollae* albae (ex *Kerr*) tubus 3·25 mm. longus, intus superne densius villosus, lobi imbricati, oblongi, 5 mm. longi, 2 mm. lati, haud ciliati. *Antherae* lineares, apiculatae, 4·5 mm. longae, filamentis 0·5 mm. longis. *Ovarii* loculi 3-ovulati; stylus 8 mm. longus, paulo supra basem pilosus, stigmate fusiformi.

Mê Ka Mi, near Rawng Kwang, evergreen jungle, 210 m., *Kerr* 2367.

Tarenna Vanprukii, *Craib* [Rubiaceae–Gardenieae]; ab affini *T. attenuata* (Webera attenuata, *Hook. f.*), foliis majoribus, corollae tubo breviore, stylo glabro, inter alia differt.

Frutex sempervirens, inflorescentia excepta glaber, ramulis cortice rubro-brunneo mox reticulato-striato obtectis. *Folia* ovato-oblonga vel ovato-lanceolata, apice acute acuminata, basi attenuato-cuneata, 13–19 cm. longa, 4·5–6·6 cm. lata, chartacea, sicco fuscescentia, nervis lateralibus utrinque 7–11 pagina utraque prominulis, omnino glabra nisi ad nervorum axillos infra parce pilosa, petiolo 1·3 2 cm. longo supra vix canaliculato suffulta; stipulae inter se connatae, cuspidato-acuminatae, ad 8 mm. longae. *Inflorescentia* terminalis, breviter pedunculata, parcius puberula, e cymis corymbosim dispositis constituta, 6 cm. longa, 12 cm. diametro; ramulorum inferiorum pedunculus communis ad 3 cm. longus; bracteae bracteolaeque parvae; pedicelli breves. *Receptaculum* calyci subaequilongum, circa 1 mm. altum, puberulum. *Calycis* lobi 0·5 mm. longi, 0·75 mm. lati, extra puberuli, intus pilis perpaucis brevibus adpressis instructi. *Corollae* tubus 1·5 mm. longus, ore dense pilosus, lobi imbricati, 8 mm. longi, 2·5 mm. lati, haud ciliati. *Antherae* lineares, 6·5 mm. longae. *Ovarii* loculi uniovulati; stylus 1 cm. longus, glaber.

Prê, Hue Lurm, 300 m., *Phra Vanpruk* 246.

Vernonia Garrettiana, *Craib* [Compositae-Vernonieae]; a *V. peguense*, C. B. Clarke, cui affinis, foliis integris, capitulis majoribus, achaeniis pubescentibus distinguenda.

Frutex ad 2·4 cm. altus; ramuli primo tenuiter breviter adpresse pubescentes, virides, demum fere glabri, sulcati, brunneo-corticati, fistulosi. *Folia* ovato-lanceolata, elliptico-obovata vel obovata, apice breviter acute acuminata, basi cuneata, vel acuminata, decurrentia, usque ad 19·5 cm. longa et 10·5 cm. lata, chartacea vel tenuiter chartacea, pagina superiore pilis brevibus adpressis parce instructa, inferiore aureo-glandulosa et ad costam nervosque parce pubescentia, nervis lateralibus utrinsecus 7–10 intra marginem anastomosantibus pagina utraque prominulis, nervis transversis inter se satis distantibus et parallelis subtus prominulis supra subconspicuis vel subprominulis, petiolo usque ad 2 cm. longo supra canaliculato suffulta. *Capitula* in paniculas ramulos laterales terminantes foliatas circa 10–16 cm. longas et 6–10 cm. latas disposita, pedunculis vix 1 cm. longis ut rhachi densius breviter adpresse

fulvo-pubescentibus suffulta; involueri bracteae exteriores anguste triangulares, apice acutae, 3 mm. longae, 1·5 mm., latae, dorso setulis perpaucis adpressis et glandulis paucis aureis instructae, medianae, triangulares, apice acutae, 3·5 mm. longae, circa 2 mm. latae, dorso glabrae, interiores oblongo-oblanceolatae, apice subobtusae, 6–8 mm. longae, circa 2 mm. latae, dorso glabrae, omnes intus glabrae, ciliatae. *Pappus* subbiseriatus, barbellatus, 8 9 mm. longus. *Achaenia* 3·5 mm. longa, 0·75 mm. diametro, longitudinaliter sulcata, in sulcis glandulosa, pubescentia. *Receptaculum* parce pubescens.

Mê Maw, eng jungle, 330 m., *Kerr* 2341.

Maba castanea, *Craib* [Ebenaceae]; foliis ovato-oblongis vel oblongo-rotundatis coriaceis sicco castaneis cognoscenda.

Arbor circiter 6-metralis (ex *Kerr*); ramuli juventute dense griseo-puberuli, cito puberuli, cortice fusco-brunneo vel brunneo obtecti. *Folia* ovato-oblonga vel oblongo-rotundata, apice obtusa vel rotundata, saepe fere truncata, basi rotundata vel truncata, saepissime leviter cordata (5) 7·5–13 cm. longa, (3·2) 5–8 cm. lata, coriacea, sicco castanea, infra pallidiora, pagina inferiore primo breviter arctius adpresse pubescentia, matura costa puberula, pilis brevibus inconspicuis adpressis hic illic sparsissime instructa, pagina superiore glabra, subnitida, nervis lateralibus utrinque 8–10 supra conspicuis saepe subprominulis infra prominulis, nervulis paucis pagina utraque subconspicuis, margine primo ciliata, mox glabra cartilagineaque, petiolo 0·8–1·2 cm. longo supra apicem versus canaliculato primo densius puberulo suffulta. *Inflorescentia* mascula axillaris, sessilis, spiciformis, basi dense imbricatim bracteata, rhachi bracteisque extra sericeis; bracteae florales naviculiformes, circiter 4 mm. longae, deciduae. *Calyx* ellipsoideo-tubulosus, breviter 3-lobatus, 6–7 mm. longus, 4 mm. diametro, extra breviter parcius sericeus. *Corolla* alba (ex *Kerr*): tubus 8 mm. longus, extra basi glaber, superne breviter sericeus; lobi 3, oblongo-elliptici, apice rotundati, 5·5 mm. longi, 3·75 mm. lati, dorso sericei. *Stamina* 12, antheris acutis circiter 2 mm. longis. *Fructus* ambitu oblongus vel elliptico-rotundatus, usque ad 2·2 cm. longus et 2 cm. diametro, ater, basi apiceque parce breviter adpresse pubescentibus exceptis glaber, calyce truncato patelliformi circiter 9 mm. diametro persistente.

Ban Na, 150 m., *Kerr* 2956 (♂); Sriracha, 24 m., *Mrs. D. J. Collins* 172.

Diospyros cratericalyx, *Craib* [Ebenaceae]; a *D. undulata*, Wall., calyce fructescente crateriformi haud patelliformi, seminibus minoribus recedit.

Arbor, ramulis primo breviter adpresse ferrugineo-pubescentibus mox glabris cortice atro-brunneo pauci-lenticellato obtectis. *Folia* saepissime oblonga vel oblongo-elliptica, utrinque acuminata, ad 13 cm. longa, 5·5 cm. lata, chartacea vel subcoriacea, pagina superiore glabra, inferiore juventute adpresse strigillosa, demum plus minusve glabrescentia, nervis lateralibus utrinsecus plerumque 8–9 intra marginem anastomosantibus supra conspicuis subtus prominentibus, costa supra im-

pressa, reticulatione laxa supra conspicua, grandulis duabus prope basem instructa, petiolo 1–1·5 cm. longo supra canaliculato suffulta. *Flores* deficientes. *Fructus* subsessilis; calyx crateriformis, extra subconspicue vel interdum obscurius 5-costatus, extra basi breviter adpresse fulvo-pubescens, apicem versus glabrescens, intus dense adpresse fulvo-pubescens; tubus 8–9 mm. altus, ore 1·5 cm. diametro; lobi late triangulares, acuminati, obtusi, 5–7 mm. longi, 1–1·2 cm. lati; fructus globosus, vel ellipsoideus, breviter apiculatus, circa 2 cm. altus, adpresse ferrugineo-pubescens; semina castanea, 1·3 cm. longa.

Sriracha, Nawng Kaw, evergreen jungle, 30 m., *Kerr* 2059, *Mrs. D. J. Collins* 345.

5977 **Aganosma siamensis,** *Craib* [Apocynaceae-Echitideae]: ab *A. gracili*, Hook. f., sepalis corollaque minoribus recedit.

Frutex volubilis; ramuli primo breviter adpresse albo-strigosi, mox glabri, cortice atro-brunneo sparse lenticellato reticulato-striato obtecti. *Folia* plerumque oblonga, apice acute acuminata, basi cuneata vel rotundata, usque ad 15 cm. longa et 6·7 cm. lata, chartaceo-membranacea, sicco supra fusco-brunnea, subtus pallidiora, pagina utraque glabra, costa supra saltem basem versus impressa, nervis lateralibus utrinsecus 6–9 intra marginem anastomosantibus supra subprominulis subtus prominulis, nervulis subobscuris, margine pauperrime ciliata; petioli plerumque circa 1 cm. longi, pilis paucis albis adpressis instructi, supra canaliculati. *Inflorescentia* generis, pedunculo communi brevi vel omnino deficiente cum rhachi pedunculisque partialibus adpresse strigilloso; pedicelli 5–7 mm. longi, tomentelli; bracteae cito deciduae, 5 mm. longae. *Sepala* inter se inaequalia, anguste lanceolata ovatave, acuminata, acuta, usque ad 2·8 cm. longa et 6 mm. lata, utrinque griseo-tomentella. *Corollae* albae (ex *Kerr*) tubus paulo ultra 1 cm. longus, extra griseo-tomentellus, intus superne dense pilosus, lobi 3·5 cm. longi, 1·3 cm. lati. *Stamina* 5·5 mm. longa, fere ad tubi basem affixa. *Fructus* carpella 14 cm. longa, circa 7 mm. diametro, adpresse strigillosa, glabrescentia.

Chiengmai, Doi Sutep, evergreen jungle, 660 m., *Kerr* 1797.

XLVI.—OROPHEA POLYCARPA AND ARTABOTRYS BURMANICUS.

W. G. Craib.

Orophea polycarpa, *A. DC.*—The somewhat inadequate material collected by Wallich and described by De Candolle under the above name has led to confusion resulting in the name being applied to a totally different Andaman plant. Hooker and Thomson in their Flora Indica state that they had no material for dissection and that they derived their description of the flower from the original. Kurz in his Andaman Report (infra cit.) gives the first record of the Andaman plant. At first he regarded it as distinct from De

Candolle's species and named it *Melodorum monospermum* without, however, providing any description. Afterwards he published it as *Orophea polycarpa*, quoting as a synonym his own nomen nudum. Coming to the Flora of British India we find the Andaman plant included in the description of De Candolle's species. Subsequent authors have acquiesced in Flora of British India treatment until, in King's monograph of the Indian *Anonaceae*, we find the description and figure of *O. polycarpa* apply wholly to the Andaman plant.

The receipt of copious material from Siam and Burma led the writer to examine one of the few flowers in the Wallichian herbarium, with the result that he finds the Burmo-Siamese plant agrees exactly with Wallich's and also with Pierre's *O. anceps*.

It thus becomes necessary to find a new name for the Andaman plant, and the writer proposes to use Kurz's specific name for it, although this name cannot be said to be a very appropriate one in the genus.

Descriptions of the two species do not appear necessary since for *O. polycarpa* we have De Candolle's original description and also Pierre's figure and description of *O. anceps* and for *Melodorum monospermum* we have King's description and figure of *O. polycarpa*.

The synonymy and distribution of the two species is as follows:—

O. polycarpa, *A.DC.* in Mem. Soc. Genev. v. p. 39; Hook. f. et Th., Fl. Ind., i. p. iii; Griffith, Ic. Pl. Ind. Or. iv. t. 654; Hook f. et Th. in Hook. f. Fl. Brit. Ind., i. p. 91 (*pl. Andaman. excl.*); Kurz in Journ. As. Soc. Beng., xliii. 2 p. 58 et For. Fl. Brit. Burma, i. p. 49 (*pl. Andaman. excl.*); King in Journ. As. Soc. Beng., lxi. 2 p. 85 et in Ann. Roy. Bot. Gard. Calc., iv. p. 109 (*pl. Andaman., floris descr. et tab. excl.*); Brandis, Indian Trees, p. 18, *quoad pl. burmanicam*. *O. anceps*, Pierre, Fl. For. Cochin t. 46; Finet et Gagnep. in Bull. Soc. Bot. Fr., Mem. 4 p. 156 et in Lecomte Fl. Gen. Indo-Chine, i. p. 116. *Bocagea polycarpa*, Steud.

Burma: banks of Salween, anno 1827, *Wall. Cat.* 6431; Ava journey, *Griffith*, 399; Amherst, Thaungyin valley, *Lace* 4715.

Siam: near Pang Pue, Pa Hin, evergreen jungle, 400 m., *Kerr* 3172; Prê, 180 m., *Phra Vanpruk* 324; Mê Thow, 600 m., evergreen jungle, *Khun Winit* 86.

Cambodia: Samrong-tong, *Pierre* 738, 738 c.

Orophea monosperma, *Craib*, comb. nov. *O. polycarpa*, Hook. f. et Th. in Hook. f. Fl. Brit. Ind., i. p. 91 (*quoad pl. Andaman.*); Kurz in Journ. As. Soc. Beng., xliii. 2, p. 58 et For. Fl. Brit. Burma, i. p. 49 (*quoad pl. Andaman.*); King in Journ. As. Soc. Beng., lxi. 2 p. 85 et in Ann. Roy. Bot. Gard. Calc., iv. p. 109, t. 151 A (*pl. burman. citatis et syn. Steud. tantum excl.*), *non* A.DC. *Melodorum monospermum*, Kurz in And. Rep., App. B., p. 1 — nomen tantum.

South Andaman, *Kurz, King, King's Collector.* Middle Andaman, *Parkinson* 100.

Artabotrys burmanicus, *A.DC.*—The history attaching to this species is practically a repetition of that of *Orophea polycarpa*, A.DC. A misidentification has led to the name being at the present day attached to a plant totally different from that originally described by De Candolle.

The synonymy and distribution of the two species is as follows:—

Artabotrys uniflorus, *Craib*, comb. nov. *A. burmanicus*, Hook. f. et Th., Fl. Ind., i. p. 129; Kurz, For. Fl. Brit. Burma. i. p. 32; Hook. f. et Th. in Hook. f. Fl. Brit. Ind., i. p. 55; King in Ann. Roy. Bot. Gard. Calc., iv. p. 47 t. 62 (*omnes quoad plantas petala triquetra habentes*) *non* A.DC. *Ropalopetalum uniflorum*, Griff. Not., iv. p. 717.

Tenasserim, *Griffith* 890 (K.D. 430), *Proudlock*.

A barren specimen from Pegu—*Kurz* 1863 may also belong here.

A. burmanicus, *A.DC.*, Mem., p. 36: auct. supra citati quoad plantam Wallichianam tantum.

Wall. Cat. 6418. Mandalay, Zibingyi, 560 m., *Lace* 5185.

Besides the Burmese plants King, l.c. quotes also a plant from Manipur. Unfortunately this plant is in fruit only, but it certainly belongs to neither of the above species. Finet and Gagnepain in Lecomte's Fl. Gen. Indo-Chine record and describe a plant as *A. burmanicus*, but whatever their plant may be their description makes *A. burmanicus* an impossible identification.

XLVII.—MISCELLANEOUS NOTES.

Botanical Magazine for November.—The plants figured are *Rhododendron carneum*, Hutchinson (t. 8634); *Sierckingia Shepheardii*, Rolfe (t. 8635); *Anemone obtusifolia*, Don. forma *patula*, Craib (t. 8636) and *Potentilla davurica*, Nestl. var. *Veitchii*, Jesson (t. 8637).

Rhododendron carneum is an attractive pink-flowered species found in the Northern Shan States by Major C. W. Brown at an altitude of 7500 ft. From the seed sent by him to Col. F. B. Longe, Holly Lodge, Norwich, the subject of the plate has been grown. In Burma it grows to a height of about 3 ft. on open grassy hillsides. This species is most nearly allied to *R. Veitchianum*, Hook., but in the latter the calyx-lobes are ciliate and usually much larger, and the corolla is white with suberect lobes.

Reichenbach founded the genus *Sierckingia* in 1871 on a species from Costa Rica. Now six species of this interesting genus are known inhabiting Costa Rica, British Guiana, Ecuador, Colombia and Peru. The species figured was collected in Colombia in the Rio Condoto Choco by Dr. S. Shepheard, and is now in the Kew Collection. *S. Shepheardii* differs from other species in having two leaves to the pseudo-bulbs and in its erect, many-flowered scapes.

Mount Victoria in Western Burma is the home of *Anemone obtusifolia* and the form figured was collected by Lady Wheeler Cuffe at a high altitude on that mountain in 1913, and has been grown in the Royal Botanic Gardens, Glasnevin. The species is widely distributed from Kashmir to Western China, with this southern extension to Mount Victoria. The plant is very variable in size, colour, and hairiness, the form figured has beautiful purplish-blue flowers.

The variety of *Potentilla davurica* here figured is one of the most attractive of the shrubby Potentillas. A native of upland thickets in Szechuan and W. Hupeh, at some 6000 ft. above sea level, it was introduced to cultivation by Messrs. J. Veitch & Sons through seed collected by Mr. E. H. Wilson in 1900. The plant figured is intermediate between *P. fruticosa*, Linn., and *P. davurica*, Nestl., but is nearer to the latter species, from which it differs in its more lax habit and more or less hairy leaflets.

Botanical Magazine for December.—The plants figured are *Fatsia japonica*, Dene. et Planch. (t. 8638); *Euonymus oxyphyllus* Miq. (t. 8639); *Iris bracteata*, S. Watson (t. 8640), and *Prunus Maximowiczii*, Rupr. (t. 8641).

Fatsia japonica and its variegated forms have long been familiar garden plants, being commonly used in conservatory and room decoration and in subtropical bedding. In favoured localities the species is hardy and will attain a height of 13 ft., and even at Kew plants in the Bamboo Garden have stood since 1891, suffering from cold only in the severe frosts of February, 1895. The genus as now understood includes only *F. japonica*, as *F. papyrifera*, Benth. & Hook. f., figured in the Botanical Magazine at t. 4697 under the name of *Aralia papyrifera*, Hook., has been transferred to *Tetrapanax*, and *F. horrida*, Benth. & Hook. f., to *Echinopanax*, and is figured at t. 8572 as *E. horridus*, Dene. and Planch. The name *Fatsia*, given to the genus by Decaisne and Planchon, was supposed to be from Fatsi, the native name of the plant, but this, according to Franchet and Savatier, is more correctly written Iats'de.

Like the *Fatsia*, *Euonymus oxyphyllus* is a native of Japan, the latter extending into Corea. Though closely resembling the European *E. latifolius*, Scop., especially in its flowers, it may be easily distinguished by its fruits, which are not lobed; these are very attractive, being carmine, while the seeds, which adhere to the placentas some time after the dehiscence of the fruits, are enveloped in a scarlet arillus. The specimen for the figure was provided by a plant received from the Arnold Arboretum in 1895. It has proved itself to be quite hardy and thrives in a loamy soil.

Iris bracteata comes from Oregon, where it was discovered in 1884 by Mr. T. Howell. It has been cultivated at Kew for many years and succeeds well, flowering in May or early June, about a fortnight later than in the wild state. The specimen figured has yellow flowers with brownish-purple veins on the outer segments. These veins, however, are not always present in flowers on wild specimens, and Mr. W. R. Dykes has called

attention to various colour varieties or hybrids in which the yellow of the flowers is replaced by red, but having the characteristic veining.

Prunus Maximowiczii was originally found in Eastern Manchuria by Ruprecht in 1857; since then it has been met with in Corea, Sachalin and Japan. Its first appearance in this country dates from 1895, when Prof. Sargent sent it to Kew from the Arnold Arboretum. The species is included in the *Mahaleb* section of the cherries, and is remarkable among the species in cultivation in the conspicuous foliaceous bracts borne by the inflorescence. Its flowers are at first white, changing to pinkish as they fade, and are rather small, while the globose fruits pass from red to black and are a quarter of an inch across.

Volume 141 of the work, which is completed with this issue, is dedicated to S. T. Heard, Esq., "in whose garden at Rossdohan, near Kenmare, so many plants whose portraits embellish the Botanical Magazine find a congenial home."

Agriculture in Colombia.—Mr. M. T. Dawe, who was recently appointed Agricultural Adviser to the Colombian Government, has recorded some impressions of the present condition and possibilities of agriculture in Colombia received during a journey from Santa Marta to Bogotá.*

In Santa Marta there are two agricultural zones, a lower and an upper, characterised respectively by the cultivation of the banana and coffee. The export of bananas for the year 1915 had been estimated at 8,000,000 bunches, but it is now calculated that 2,500,000 bunches less will be exported owng to the extensive damage caused by a tornado. Although there is already a bi-weekly service of steamers engaged in carrying bananas to the United States and Europe, there seems to be room for considerable expansion of the trade. The rainfall in the lower zone is so irregular and uncertain that, apart from such xerophytes as *Agave*, cultivation on a commercial scale is practically impossible without irrigation. This zone would be very suitable for the cultivation of *Agave*, in which, owing to its favourable geographical situation and facilities for transport, Santa Marta might become a formidable competitor of Tropical East Africa. Although the physical conditions are suitable for the cultivation of cotton, it is improbable that this could be profitably grown on a commercial scale, owing to the high rate of wages.

Pará and Guinea grass are used for pastures in the Santa Marta region. Mr. Dawe recommends the introduction of other pasture and fodder-plants, and especially of the Velvet bean.

In the upper agricultural zone of Santa Marta coffee is the only plant cultivated on a large scale, the largest plantation being the "Cincinnati," which has about 350,000 trees. Coffee seems to do best at an altitude of about 4500 ft. in the Sierra Nevada. The trees are sown at intervals of about 8 ft., and are neither topped nor pruned. The shade-tree employed is the guamo (*Inga dulcis*). The average annual yield of dry coffee per tree

---

* *La Patria*, Bogatá, October 2nd, 1915.

is said to be 1 lb., and in exceptionally favourable years as much as 1½ lbs. The trees seem to suffer from over-shading, and better results might be obtained by the use of species of *Albizzia* or *Erythrina* as shade-trees, coupled with judicious topping and pruning. A disease affecting both the leaves and fruits of the coffee, on which it appears in the form of round blotches, is probably caused by the fungus *Omphalia flavida*, Cooke. It is most abundant in deep ravines and shady places.

From Santa Marta Mr. Dawe travelled by rail to Cienaga, and thence by steam-launch to Barranquilla, passing extensive stretches of mangrove swamps. Small quantities of mangrove bark are exported to New York *via* Puerto Rico, but there is no doubt that many thousand tons could be exported annually if the Magdalena delta were suitably exploited. The mangrove bark destined for export seen in Barranquilla was divided into large pieces, whereas that exported from Madagascar and East Africa is cut into small pieces, 5 in. long and 2 in. broad.

The most noticeable thing in the journey up the River Magdalena, from Barranquilla to Girardot, was the great extent of fertile alluvial land, capable of producing enormous crops of sugar, cocoa, rubber and other tropical products; but the country is very sparsely inhabited, and the inhabitants obtain their living by cutting wood for the passing steamers, and grow no more food than is required for their own needs.

The first step in the development of this region should be the improvement of the navigable channel of the Magdalena. The practice of cutting the trees on the river-banks should be prohibited, as this leads to the washing away of the banks.

The condition of agriculture in the Lower Magdalena region might be greatly improved by the establishment of a model plantation conducted on commercial lines, where sugar, cocoa, rubber, cotton, maize, rice, kidney-beans, etc., could be grown, and the best methods of cultivation demonstrated.

Immense areas of the Lower Magdalena basin are covered with forests, which might under suitable administration become one of the principal sources of revenue in Colombia, judging from the large selection of useful woods seen by Mr. Dawe at Barranquilla. A duty should be imposed on each tree of certain kinds that is felled, and the work of re-afforestation should be taken in hand in areas where the forests have been destroyed. This is especially necessary in the Upper Magdalena region, where there is a scarcity of wood for the steamers in certain places.

The estate of Santa Sofía, at Giradot, was examined with a view to its suitability as the site of an agricultural experiment-station and college. The means of communication are very good, as Giradot is the junction of the railways to Bogotá and the Pacific Coast, and the upper limit of steam navigation on the Magdalena. The soil of the district is of medium quality and suitable for the cultivation of *Agave*, but other crops would probably require irrigation.

Evidence of the ravages of locusts was seen throughout the journey, and Mr. Dawe recommends the establishment of a Locust Bureau to control the pest.

INDEX.

A.

Acacia columnaris, *Craib*, 410.
— Gageana, *Craib*, 409.
— Hohenackeri, *Craib*, 408.
— insuavis, *Lace*, 401.
— macrocephala, *Lace*, 401.
— Myaingii, *Lace*, 114.
— oxyphylla, *Graham*, 409.
— torta, *Craib*, 410.
Acanthopanax leucorrhizum, 126.
Acronychia Barberi, *Gamble*, 345.
Aden, Flora of, Blatter, 416.
Adina indivisa, *Lace*, 115.
Aganosma siamensi , *Craib*, 433.
Aglaia Barberi, *Gamble*, 346.
— Bourdillonii, *Gamble*, 346.
— canarensis, *Gamble*, 347.
Agriculture in Colombia, 437.
Aikman, J., 118.
Albizzia crassiramea, *Lace*, 402.
Alder, black or berry-bearing, for gunpowder, 304.
Algae, Chinese Marine, 107.
— Greenland, 64.
Allospondias laxiflora, *Lace*, 397.
Alpinia mutica, 359.
Amelanchier florida, 307.
Anemone obtusiloba, f. patula, 435.
Appointments :—
Aikman, J., 118.
Bovell, J. R., 411.
Brierley, W. B., 261.
Cotton, A. D., 118.
Craib, W. G., 355.
Dawe, M. T., 306.
Flippance, F., 356.
Fries, Dr. R. E., 181.
Green, Miss M. L., 356.
Harland, S. C., 181.
Hutchinson, J., 356.
Mould, G. B., 94.
Pettigrew, A. A., 118,
— W. W., 118.
Warren, C., 411.
Arbustum Americanum, Marshall's, 309.
Aristolochia longecaudata, 308.
Artabotrys burmanicus, 433.
— uniflorus, *Craib*, 435.
Arthrosolen variabilis, *C. H. Wright*, 77.
Arundinaria vagans, *Gamble*, 350.
Asterostroma persimile, *Wakefield* (with figs.), 372.
Asterostromella rhodospora, *Wakefield* (with figs.), 372.
Australia, a collection of fungi from (with plates), 361.

B.

Badderley, Mrs., 306.
Bailey, F. M., 356.
Baissea Lane-Poolei, *Stapf*, 46.
Barbey, William, 94.
Bauhinia sericea, *Lace*, 400.
Bean, W. J., Trees and Shrubs hardy in the British Isles, 182.
Bergielund Botanic Garden, 181.
Blatter, Flora of Aden, 416.
Blister disease of Fruit trees (with plate), 104.
Bombax Kerrii, *Craib*, 424.
Books :—
Arbustum Americanum, 309.
Botanical Magazine, 63, 124, 307, 358, 391, 413, 435.
Cotton cultivation in the West Indies, 64.
Flora Capensis, 311.
— of Aden, 416.
— of the Upper Gangetic Plain, 414.
Materials for a Flora of the Malayan Peninsula, 415.
Official Guide to the Botanic Gardens, Dominica, 311.
Report on Plantation Work in Cyprus, 1879–1914, 360.
Sylviculture in the Tropics, 96.
Trees and Shrubs hardy in the British Isles, 182.
Wild Rubber and Selection, 183.
Botanic Gardens :—
Bergielund Botanic Garden, 181.
Dominica Botanic Gardens, 311, 392.
Botanical Magazine, 63, 124, 307, 358, 391, 413, 435.
Bovell, J. R., 411.
Briar wood for pipes, 127.
Brierley, W. B., 261.
Brodiaea recurvifolia, *C. H. Wright*, 117.
Broun, A. F., Sylviculture in the Tropics, 96.
Brown, N. E., Monograph of all the known species of Sansevieria (with plates and figs.), 185, 260.
Buettneria integrifolia, *Lace*, 396.
Burma, some new species from, 393.

C.

Camphor Tree, South African, 297.
Ceanothus rigidus (with figs), 379.
— —, var. pallens (with figs.), 380.
Centratherum burmanicum, *Gamble*, 90.
Church, Sir A. H., 263.
Cirrhopetalum Fletcherianum, 125.
Cissus Craibii, *Gagnepain*, 426.
Cistanche lutea, 391.
Clematis burmanica, *Lace*, 394.
— Craibiana, *Lace*, 395.
— siamensis, *Drummond et Craib*, 420.
— unicata, f. retusa, 413.
— Wattii, *Drummond et Craib*, 421.
Cocoanuts, selection of, for germination, 72.
Colombia, agriculture in, 437.

Coniferous Timbers, 265.
Coniothecium chomatosporum (with plate), 104.
Cornus Nuttallii and its allies (with plates), 177.
— Kousa (with plate), 179.
— wood, uses of, 179.
Corticium luteo-aurantiacum, *Wakefield* (with figs.), 372.
Corylus mandshurica, 359.
Cotoneaster pannosa, 63.
— wood for golf clubs, 414.
Cotton, A. D., 118.
— cultivation in the West Indies. 64.
Craib, W. G., 355.
Cramer, Dr., wild rubber and selection. 183.
Cryptadenia laxa, *C. H. Wright*. 387.
Cryptocarya vacciniifolia, *Stapf*. 297. 298.
Cupressus formosensis, 53.
Cyprus, forestry in, 360.

D.

Dalbergia succirubra, *Gagnep. et Craib*. 428.
Dawe, M. T., 306, 437.
Dawyck, 376.
Decades Kewenses, 88, 113, 344.
Decaschistia intermedia, *Craib*, 423.
Dendrobium Hookerianum with fringed petals, 412.
Diagnoses Africanae, 44, 76.
Diaporthe ambigua (with plate), 105.
Digitaria Iburua, *Stapf* (with figs.),382.
— exilis, *Stapf* (with figs.), 385.
— orthostachya, *Stapf et Jesson*, 93.
Diospyros cratericalyx, *Craib*. 432.
— Ebenaster, 65.
— glandulosa, *Lace*, 349.
Diseases of plants :—
Blister disease of fruit trees (with plate), 104.
Coffee disease in Colombia, 438.
Coniothecium chomatosporum (with figs.), 104.
Diaporthe ambigua (with figs.), 105.
Fomes juniperinus (with figs.), 102, 311.
Fruit trees, blister disease of (with plate), 104.
Omphalia flavida, 438.
Phoma mali (with figs.), 105.
Dolichos errabundus, *Scott*, 89.
Dominica Botanic Gardens, 311. 392.
Dorstenia yambuyaensis, 308.
Duthie, Flora of the Upper Gangetic Plain, 414.

E.

Echium Perezii, 358.
Elm Trunk, Elvedon Park (with fig.). 87.
Encephalartos Hildebrandtii, 63.
Eriolaena Lushingtonii, *Dunn*, 88.
Eriosema pilosum, *Lace*, 399.
Eugenia ripicola, *Craib*, 428.
— uniflora, 124.
Euonymus longipes, *Lace*, 396.
— oxyphyllus, 436.
Evodia parviflora, *Craib*, 425.

F.

Fatsia japonica, 436.
Ficus, new Tropical African species (with figs.), 314.
— acutifolia, *Hutchinson*, 317.
— aganophila, *Hutchinson*, 338.
— annobonensis, *Mildbr. et Hutchinson*, 337.
— anomani, *Hutchinson*, 331.
— arcuato-nervata, *De Wild.*, 339.
— asymmetrica, *Hutchinson* (with figs.), 336.
— brachypoda, *Hutchinson*, 339.
— budduensis, *Hutchinson*, 340.
— Buntingii, *Hutchinson* (with figs.), 320.
— Burretiana, *Mildbr. et Hutchinson*, 344.
— camptoneuroides, *Hutchinson*, 326.
— clarencensis, *Mildbr. et Hutchinson*. 338.
— Dawei, *Hutchinson* (with figs.). 332.
— ebolowensis, *Mildbr. et Hutchinson*, 329.
— fasciculiflora, *Hutchinson* (with figs.), 324.
— glumosoides, *Hutchinson*, 336.
— golungensis, *Hutchinson*, 316.
— Gossweileri, *Hutchinson* (with figs.), 321.
— ingentoides, *Hutchinson*, 319.
— katagumica, *Hutchinson* (with figs.), 317.
— kawuri, *Hutchinson*, 319.
— Kirkii, *Hutchinson*, 343.
— kitubalu, *Hutchinson*, 334.
— Ledermannii, *Hutchinson*, 340.
— leonensis, *Hutchinson*, 338.
— maculosa, *Hutchinson*, 323.
— mallotoides, *Mildbr. et Hutchinson*, 334.
— mangiferoides, *Hutchinson*, 342.
— Mildbraedii, *Hutchinson*, 344.
— mutantifolia, *Hutchinson* (with figs.), 330.
— namalalensis, *Hutchinson* (with figs.), 328.
— nyanzensis, *Hutchinson*, 327.
— praticola, *Mildbr. et Hutchinson* (with figs.), 325.
— pseudo-mangifera, *Hutchinson*, 342.
— Rederi, *Hutchinson*, 329.
— rudens, *Hutchinson* (with figs.), 322.
— stipulifera, *Hutchinson*, 326.

Ficus tettensis, *Hutchinson*, 341.
— ugandensis, *Hutchinson*, 321.
— Wakefieldii, *Hutchinson* (with figs.), 335.
— zambesiaca, *Hutchinson*, 341.
Fimbristylis Allenii, *Turrill*, 117.
— compacta, *Turrill*, 118.
Fitch, W. H., 277, 392.
Flippance, F., 356.
Flora Capensis, 311.
— of Aden, Blatter, 416.
— — Siam, contributions to, 419.
— — the Malayan Peninsula, materials for, 415.
— — — Upper Gangetic Plain, 414.
Fomes juniperinus and its occurrence in British East Africa (with figs.), 102, 311.
Forestry in Cyprus, 360.
Fries, Dr. R. E., and the Bergielund Botanic Garden, 181.
Fruit trees, blister disease of (with plate), 104.
Fundi and Iburu, two cereals of Upper Guinea (with figs.), 381.
Fungi from Australia and New Zealand (with plates), 361.

G.

Gentiana barbata, f. grandiflora, 307.
— gracilipes, 413.
Gladiolus Melleri, 391.
Gnetum Kingianum, *Gamble*, 92.
— Wrayi, *Gamble*, 92.
Golf Clubs, Cotoneaster wood for, 414.
Granger, W., 120.
Green, Miss M. L., 356.
Greenland Algae, 64.
Grubbia, 100.
Gunpowder, black or berry-bearing alder for, 304.
Gutzlaffia glandulosa, *Lace*, 406.
Gwynne-Vaughan, Prof. D. T., 389.
Gymnosporia obovata, *Craib*, 426.

H.

Harland, S. C., 181.
Harvey, F. W., 390.
Heliotropium undulatifolium, *Turrill*, 76.
Hemsley, W. B., Walter Hood Fitch, Botanical Artist, 1817–1892, 277, 392.
Heterochaete Cheesmanii, *Wakefield* (with figs.), 373.
Hippeastrum Elwesii, 308.
Hiptage glabrifolia, *Craib*, 425.
Homalium Damrongianum, *Craib*, 429.
Honckenya, The genus, 122.
Hutchinson, J., 356.

I.

Iburu and Fundi, two cereals of Upper Guinea (with figs.), 381.
Indigofera polygaloides, *Scott*, 88.
Iris bracteata, 436.
— Urumovii, 126.
Irpex calcareus, *Wakefield*, 367.

J.

Jodrell Laboratory, research in, 56.

K.

Kaikoura Mountains, New Zealand, Flora of, 312.
Kew :—
Arboretum, additions to, 53.
— collections, 51.
Gardens, additions and alterations, 49.
Herbarium, additions to, 57.
Hybridising trees, 52.
Jodrell Laboratory, research in, 56.
Kew and the War, 96, 307.
Library catalogue, supplement to, Appendix II.
— presentations to, 60.
Museums, 55.
—, presentations to 121, 357.
Official visits of staff, 55.
Pagoda, 411.
Pathology, 57.
Pathological Laboratory, 121, 264.
Storms at, 52.
Waterfowl, 54.

L.

Lace, J. H., Some new species from Burma, 393.
Lepidium oxytrichum, *Sprague*, 123.
Lightfootia cartilaginea, *Scott*, 45.
— graminicola, *Scott*, 45.
Linociera Beccarii, *Stapf*, 115.
— elaeocarpa, *Stapf*, 115.
— evenia, *Stapf*, 116.
Lock, Dr. R. H., 307.
Lonicera Buchananii, *Lace*, 403.
Loranthus, the South African sections of, 67.
— Bolusii, *Sprague*, 81.
— Galpinii, *Schinz ex Sprague*, 79.
— minor, *Sprague*, 80.
— Moorei, *Sprague*, 80.
— subcylindricus, *Sprague*, 78.
— Wylici, *Sprague*, 78.
Lotus campyloclados, f. villosior, 125.

M.

Maba castanea, *Craib*, 432.
Mahonia confusa, 128.
— siamensis, *Takeda*, 422.
Malayan Peninsula, materials for a Flora of, 415.

Marsdenia carnosa, *Lace*, 404.
Marshall's Arbustum Americanum, 309.
Massee, G., retirement of, 118.
Meconopsis, some additional species (with plates), 129.
— aculeata, var. nana, *Prain*, 144.
— argemonantha, *Prain*, 161.
— Baileyi, *Prain*, 161.
— concinna, *Prain*, 163.
— decora, *Prain*, 143.
— eximia, *Prain*, 159.
— impedita, *Prain*, 162.
— —, var. Morsheadii, *Prain*, 163.
— latifolia, *Prain*, 146.
— lepida, *Prain*, 158.
— napaulensis (with plates), 174.
— paniculata (with plate), 170.
— Prattii, *Prain*, 148, 358.
— psilonomma, *Farrer*, 160.
— robusta (with plate), 171.
— rudis, var. intermedia, *Prain*, 151.
Medley Wood, J., 417.
Meliosma Mannii, *Lace*, 113.
Melochia Gardneri, *Sprague*, 124.
— ulmifolia, 123.
Mesembryanthemum stylosum, 63.
— thecatum, 63.
Metrosideros diffusa, 391.
Mimosa caesia, 407.
— Intsia, 407.
Miscellaneous Notes, 49, 94, 118, 181, 261, 306, 355, 389, 411, 435.
Mormodes tigrinum, 124.
Mould, G. B., 94.
Mucuna Collettii, *Lace*, 398.
Mueller, Hugo, 261.
Murray, Sir James, 350.

N.

Naravelia siamensis, *Craib*, 419.
New garden plants, Appendix III.
— Zealand, Flora of the Kaikoura Mountains, 312.
— — fungi (with plates), 361.

O.

Obituary notices :—
Badderley, Mrs., 306.
Bailey, F. M., 356.
Barbey, William, 94.
Church, Sir A. H., 263.
Granger, W., 120.
Gwynne-Vaughan, Prof. D. T., 389.
Harvey, F. W., 390.
Lock, Dr. R. H., 307.
Mueller, Hugo, 261.
Murray, Sir James, 350.
Wood, Dr. J. Medley, 417.
Woodward, Robert, Jr., 263.
Old Trees, the care of (with plates), 82.
Ornithoboea Lacei, 391.
Orophea monosperma, *Craib*, 434.
— polycarpa and Artabotrys burmanicus, 433.
Osyris abyssinica, var. speciosa. *A. W. Hill*, 100.
Oxyspora rupicola, *Lace*, 402.

P.

Passerina Galpini, *C. H. Wright*, 386.
— laniflora, *C. H. Wright*, 386.
— rubra, *C. H. Wright*, 387.
Peniophora Cheesmanii, *Wakefield*, 371.
— vermicularis, *Wakefield* (with figs.), 371.
Pentacme tomentosa, *Craib*, 423.
Pettigrew, A. A., 118.
—, W. W., 118.
Phelipaea (with plate), 285.
— Boissieri, *Stapf*, 291.
— foliata (with plate), 292, 308.
— Tournefortii, 290.
Phoma mali (with plate), 105.
Phyllanthus flacourtioides, *Hutchinson*, 48.
Pimelea tenuis, *Scott*, 116.
— — var. longistyla, *Scott*, 117.
Pines, European, their commercial importance and relation to British Forestry, 265.
Pinguicula gypsicola, 125.
Pleiocarpa tricarpellata, *Stapf*, 47.
Polyalthia obtusa, *Craib*, 421.
Polygala palustris, *Lace*, 344.
— pellucida, *Lace*, 395.
Polystachya paniculata, 358.
Populus lasiocarpa, 391.
Potentilla davurica, var. Veitchii, 435.
Primula Miyabeana, 126.
— pycnoloba, 307.
Promenaea microptera, 413.
Prunus Maximowiczii, 436.
Pueraria Lacei, *Craib*, 399.
Pyrus yunnanensis, 413.

R.

Rhamnus frangula, 304.
Rhododendron carneum, 435.
— concinnum, 358.
— Davidsonianum, 126.
— moupinense, 124.
— Souliei, 359.
— stamineum, 125.
Ribes Maximowiczii, *Batalin*, var. floribundum *Jesson*, 347.
Rosa cerasocarpa, *Rolfe*, 89.
Rubber, wild, and selection, 183.

S.

Sansevieria, a monograph of all the known species (with plates and figs.), 185.
—, index to species and synonyms, 260.

Sansevieria, burmanica, *N. E. Brown* (with fig.), 228.
— canaliculata (with fig.), 224.
— caulescens, *N. E. Brown* (with fig.), 200.
— chinensis (with figs.), 242.
— concinna, *N. E. Brown* (with fig.), 233.
— conspicua (with figs.), 243.
— cylindrica, var. patula, *N. E. Brown*, 218.
— Dawei (with plates), 247.
— deserti, *N. E. Brown*, 208.
— Dooneri, *N. E. Brown* (with fig.), 230.
— gracilis, *N. E. Brown* (with fig.), 204.
— grandis, var. zuluensis, *N. E. Brown* (with figs.), 251.
— intermedia (with fig.), 211.
— Kirkii (with figs.), 254.
— — var. pulchra, *N. E. Brown*, 256.
— longiflora, var. fernandopoensis, *N. E. Brown*, 257.
— metallica, var. longifolia, *N. E. Brown*, 247.
— — — nyasica, *N. E. Brown* (with figs.), 246.
— nilotica, var. obscura, *N. E. Brown*, 238.
— parva, *N. E. Brown* (with fig.), 233.
— patens, *N. E. Brown* (with fig.), 210.
— Pearsonii (with fig.), 216.
— Powellii, *N. E. Brown* (with fig.), 198.
— Raffillii, *N. E. Brown* (with figs.), 252.
— — var. glauca, *N. E. Brown*, 252.
— rhodesiana, *N. E. Brown* (with fig.), 212.
— robusta, *N. E. Brown*, 207.
— rorida, *N. E. Brown*, 205.
— senegambica (with fig.), 235.
— sordida, *N. E. Brown* (with fig.), 215.
— Stuckyi (with fig.), 219.
— subspicata (with fig.), 234.
— subtilis, *N. E. Brown* (with fig.), 237.
— suffruticosa, *N. E. Brown* (with fig.), 202.
— trifasciata, var. Laurentii, *N. E. Brown*, 240.
— varians, *N. E. Brown*, 209.
Santalaceae, South African, 97.
Schima brevipes, *Craib*, 423.
Sea Island Cotton in the West Indies, 64.
Seeds available for distribution, Appendix I.
Senecio glastifolius, 359.
Siam, Flora of, contributions to, 419.
Sideroxylon Aylmeri, *Scott*, 45.
Sievekingia Shepheardii, 435.
Solanum keniense, *Turrill*, 77.
Sonerila Nisbetiana, *Craib*, 429.
South African Camphor Tree, 297.
— — Thesiums (with plates), 1.
Soyauxia floribunda, *Hutchinson*, 44.
Staffs of botanical departments. Appendix IV.
Stenocarpha, *Blake*, gen. nov., 348.
— filipes, *Blake*, 348.
Sterculia Kerrii, *Craib*, 424.
Stereum ceriferum, *Wakefield*, 370.
— rhabarbarinum, *Wakefield* (with figs.), 370.
Streptocarpus denticulata, 413.
Strobilanthes mogokensis, *Lace*, 406.
Struthiola cicatricosa, *C. H. Wright*, 389.
— congesta, *C. H. Wright*, 388.
— epacridioides, *C. H. Wright*, 387.
— longifolia, *C. H. Wright*, 389.
— Macowani, *C. H. Wright*, 388.
— pondoensis, *Gilg ex C. H. Wright*, 388.
Stylidium induratum, *Scott*, 91.
— Stowardii, *Scott*, 91.
Swertia kachinensis, *Lace*, 404.
Sylviculture in the Tropics, 96.

T.

Tarenna Collinsae, *Craib*, 430.
— pauciflora, *Craib*, 430.
— Vanprukii, *Craib*, 431.
Tetrastigma quadrangulum, *Gagnep. et Craib*, 427.
— siamense, *Gagnep. et Craib*, 427.
Thesidium fruticulosum, *A. W. Hill*, 99.
— longifolium, *A. W. Hill*, 99.
— minus, *A. W. Hill*, 98.
Thesium, in South Africa (with plates), 1, 101.
— acuminatum, *A. W. Hill* (with fig.), 22.
— aggregatum, *A. W. Hill*, 22.
— annulatum, *A. W. Hill*, 23.
— asperifolium, *A. W. Hill*, 23.
— asterias, *A. W. Hill* (with fig.), 23.
— Burchellii, *A. W. Hill*, 24.
— Burkei, *A. W. Hill*, 24.
— coriarium, *A. W. Hill*, 24.
— cornigerum, *A. W. Hill*, 25.
— costatum, *A. W. Hill*, 25.
— — var. juniperina, *A. W. Hill*, 26.
— cupressoides, *A. W. Hill*, 26.
— cuspidatum, *A. W. Hill*, 26.
— cytisoides, *A. W. Hill*, 27.
— disciflorum, *A. W. Hill*, 27.
— fimbriatum, *A. W. Hill*, 27.
— floribundum, *A. W. Hill*, 27.
— fruticosum, *A. W. Hill*, 28.
— glaucescens, *A. W. Hill*, 29.
— glomeratum, *A. W. Hill*, 29.
— gracilarioides, *A. W. Hill*, 29

Thesium, gypsophiloides, *A. W. Hill*, 30.
— helichrysoides, *A. W. Hill*, 30.
— hispidulum, var. subglabra, *A. W. Hill*, 30.
— hirsutum, *A. W. Hill* (with fig.), 31.
— hystricoides, *A. W. Hill*, 31.
— Hystrix, *A. W. Hill* (with fig.), 31.
— impeditum, *A. W. Hill*, 32.
— — var. rasa, *A. W. Hill*, 32.
— junceum, var. mammosa, *A. W. Hill* (with fig.), 33.
— — — plantaginea, *A. W. Hill*, 33.
— Junodi, *A. W. Hill*, 33.
— lacinulatum, *A. W. Hill* (with fig.), 33.
— macrogyne, *A. W. Hill*, 34.
— microcephalum, *A. W. Hill*, 34.
— Nationae, *A. W. Hill*, 34.
— nigrum, *A. W. Hill*, 35.
— nudicaule, *A. W. Hill*, 35.
— occidentale, *A. W. Hill*, 35.
— orientale, *A. W. Hill*, 36.
— Patersonae, *A. W. Hill*, 36.
— patulum, *A. W. Hill* (with fig.), 37.
— penicillatum, *A. W. Hill* (with fig.), 37.
— pleuroloma, *A. W. Hill*, 38.
— polygaloides, *A. W. Hill*, 38.
— prostratum, *A. W. Hill*, 38.
— pungens, *A. W. Hill*, 39.
— repandum, *A. W. Hill*, 39.
— rufescens, *A. W. Hill*, 40.
— Susannae, *A. W. Hill*, 40.
— scirpioides, *A. W. Hill*, 40.
— sertulariastrum, *A. W. Hill*, 41.
— spartioides, *A. W. Hill*, 41.
— submudum, var. foliosa, *A. W. Hill*, 42.
— translucens, *A. W. Hill*, 42.
— umbelliferum, *A. W. Hill*, 42.
— urceolatum, *A. W. Hill* (with fig.), 43.
— utile, *A. W. Hill*, 43.
Thumbergia Gibsonii, 126.
Thyrsopteris elegans (with plate), 295.
Tillandsia Regina, 124.
Timbers, coniferous, 265.
Tortworth arboretum, 298.
Torulinium angolense, *Turrill*, 48.
Trees and Shrubs hardy in the British Isles, 182.
Tricalysia reflexa, *Hutchinson*, 44.
Triumfetta annua, f. piligera, 311.
— benguetensis, *Sprague*, 345.
— japonica, 310.

U.

Uba cane, 418.
Uraria barbata, *Lace*, 397.
Utricularia brevilabris, *Lace*, 404.
— Rogersiana, *Lace*, 405.
— subrecta, *Lace*, 405.

V.

Vernonia Garrettiana, *Craib*, 431.
Viscum pulchellum, *Sprague*, 81.
Vitex keniensis, *Turrill*, 4

W.

Warren, C., 411.
West Indies, cotton cultivation in, 64.
Wood, J. Medley, 417.
Woodward, Robert, Jr., 263.

Z.

Zygopetalum Prainianum, 307.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX I.—1915.

LIST OF SEEDS OF HARDY HERBACEOUS PLANTS AND OF TREES AND SHRUBS.

The following is a select list of seeds of Hardy Herbaceous Plants and of Hardy Trees and Shrubs which, for the most part, have ripened at Kew during the year 1914. These seeds are available only for exchange with Botanic Gardens, as well as with regular correspondents of Kew. No application, except from remote colonial possessions, can be entertained after the end of February.

HERBACEOUS PLANTS.

Acaena adscendens.
glauca.
inermis.
macrostemon.
microphylla.
myriophylla.
Novae-Zealandiae.
ovalifolia.

Acanthus longifolius.
Perringii.

Achillea Ageratum.
ageratifolia.
argentea.
grandiflora.
Kellereri.
obscura.
umbellata.
Wilczeckii.

Aconitum barbatum.
Hemsleyanum.
rostratum.
volubile.
Wilsoni.

Actaea spicata.
— var. rubra.

Adenophora denticulata.
liliifolia.
stylosa.

Aethionema cappadocicum.
cordatum.
cristatum.
grandiflorum.
iberideum.
lacorum.
pulchellum.
saxatile.

(3541.) Wt. 225—565. 1,125. 12/14. J. T. & S. G. 14.

Agrimonia odorata.
repens.

Agropyron pungens.
villosum.

Agrostis alba.
elegans.
nebulosa.

Allium cyaneum.
Erdelii.
Fetisowii.
grande.
kansuense.
karataviense.
neapolitanum.
odorum.
Ostrowskyanum.
paradoxum.
pulchellum.
Schuberti.
subhirsutum.

Alstroemeria aurantiaca.
Ligtu.

Althaea armeniaca.
cannabina.
ficifolia.
kurdica.
pallida.
rosea.
sulphurea.
taurinensis.

Alyssum argenteum.
creticum.
incanum.
podolicum.
saxatile var. citrinum.
serpyllifolium.
sinuatum.
spinosum.

Amarantus caudatus.
chlorostachys.
hypochondriacus.
polygamus.
retroflexus.
speciosus.

Amethystea coerulea.

Ammobium alatum.

Anacyclus officinarum.

Anaphalis triplinervis.

Anemone alpina.
cylindrica.
decapetala.
multifida.
pratensis.
Pulsatilla.
rivularis.
sylvestris.

Anoda hastata.
Wrightii.

Anthemis carpatica.
mixta.
montana.
tinctoria.

Anthericum Liliago.
ramosum.

Antirrhinum Asarina.
glutinosum.
hispanicum.
Orontium.

Apera interrupta.
Spica-Venti.

Aquilegia canadensis.
chrysantha.
coerulea.
glandulosa.
pyrenaica.
truncata.

Arabis alpina.
arenosa.
aubrietioides.
coerulea.
hirsuta.
petraea.
verna.

Aralia californica.
racemosa.

Arctotis stoechadifolia.

Arenaria aretioides.
capillaris.
cephalotes.
foliosa.
gypsophiloides.
grandiflora.
laricifolia.
montana.
pinifolia.
purpurascens.
sajanensis.
Stephaniana.
tetraquetra.

Argemone grandiflora.
hispida.
mexicana.
ochroleuca.

Armeria canescens.
chilensis.
fasciculata.
majellensis.

Arnica amplexicaulis.
Chamissonis.
foliosa.
latifolia.
longifolia.
montana.
sachalinensis.

Artemisia lanata.
paniculata.
parviflora.
scoparia.
Siversiana.

Arthropodium cirrhatum.

Asperula azurea.
ciliata.
galioides.

Asphodeline lutea.

Asphodelus albus.

Aster alpinus.
batangensis.
Coulteri.
diplostephioides.
Douglasii.
foliaceus.
glaucus.
Herveyi.
junceus.
macrophyllus.
multiflorus.
radula.
subcceruleus.
Vilmorinii.

Astilbe chinensis.
rivularis.
simplicifolia.
Thunbergii.

Astragalus alopecuroides.
armeniacus.
chinensis.
Echinus.
frigidus.
Glyciphyllos.
maximus.
pentaglottis.
Sieversianus.
xiphocarpus.

Astrantia Biebersteinii.
helleborifolia.

Anthamanta Matthioli.

Atriplex littoralis.
rosea.

Atropa Belladonna.
lutescens.

Baeria coronaria.

Baptisia australis.

Barbarea arcuata.

Beckmannia erucaeformis.

Bellium crassifolium.

Berkheya Adlami.
purpurea.

Beta Bourgaei.
trigyna.

Bidens leucantha.

Biscutella ciliata.
didyma.
laevigata.

Blumenbachia insignis.
muralis.

Bocconia cordata.
microcarpa.

Brachycome iberidifolia.
— var. alba.

Brachypodium caespitosum.
japonicum.
pinnatum.
sylvaticum.

Brassica campestris.
Cheiranthos.
Erucastrum.
juncea.
rugosa.
Tourneforti.

Briza maxima.
minor.

Bromus adoënsis.
breviaristatus.
carinatus.
ciliatus.
commutatus.
japonicus.
Kalmii.
macrostachys.
marginatus.
maximus.
polyanthus.
Porteri.
rubens.
sitchensis.
squarrosus.
Tacna.
Trinii.
unioloides.

Bulbine annua.

Bunias orientalis.

Buphthalmum salicifolium.

Bupleurum aureum.
Candollei.
rotundifolium.
tenuissimum.

Cakile maritima.

Calamagrostis confinis.
Epigeios.

Calandrinia speciosa.
umbellata.

Calceolaria integrifolia.
mexicana.
polyrrhiza.

Callirhoë involucrata.
lineariloba.
pedata.

Callistephus hortensis.

Camassia esculenta.
Fraseri.
Leichtlinii.
montana.

Camelina sativa.

Campanula alliariaefolia.
barbata.
bononiensis.
collina.
Imeretina.
Kolenatiana.
lactiflora.
lanata.
latifolia.
latiloba.
longistyla.
macrostyla.
patula.
phyctidocalyx.
pulla.
punctata.
Raddeana.

Campanula– *cont.*
rhomboidalis.
sarmatica.
Scheuchzeri.
sibirica.
speciosa.
spicata.
thyrsoides.
tomentosa.
Waldsteiniana.

Capsella grandiflora.

Carbonia benedicta.

Carduus defloratus.
stenolepis.
tenuiflorus.

Carex binervis.
laevigata.

Carthamus lanatus.
tinctorius.

Carum copticum.

Catananche coerulea.
lutea.

Celmisia holosericea.
petiolata.

Celsia orientalis.

Cenia turbinata.

Centaurea axillaris.
babylonica.
dealbata.
macrocephala.
montana.
Phrygia.
pulchra.
rupestris.
ruthenica.

Centranthus macrosiphon.
Sibthorpii.

Cephalaria alpina.
ambrosoides.
radiata.

Cerastium Biebersteinii.
macranthum.
ovatum.
tomentosum.

Cerinthe major.

Chaerophyllum aromaticum.
nodosum.

Charieis heterophylla.

Chelone Lyoni.
obliqua.

Chelonopsis moschata.

Chenopodium ambrosoides.
capitatum.
urbicum.

Chlorogalum pomeridianum.

Chorispora tenella.

Chrysanthemum anserinae-
folium.
Balsamita var. tomentosum
carinatum.
caucasicum.
cinerariaefolium.
coccineum.
coronarium.
corymbosum.
Haussknechtii.
Myconis.
pallens.
prealtum.
viscosum.

Chrysopogon Gryllus.

Chrysopsis villosa.

Cimicifuga cordifolia.
foetida.
racemosa

Cladium Mariscus.

Clarkia elegans.
pulchella.

Claytonia asarifolia.

Cleome violacea.

Clintonia umbellata.

Cnicus arachnoideus.
heterophyllus.
syriacus.

Cochlearia glastifolia.

Colchicum lactum.

Collinsia bartsiaefolia.
bicolor.
grandiflora.
verna

Collomia coccinea.
gilioides.
grandiflora.

Convolvulus Cupanianus.
farinosus.
tricolor.
undulatus.

Coreopsis lanceolata.
rosea.

Coriandrum sativum.

Coronilla cappadocica.
scorpioides.

Corydalis capnoides.
cheilanthifolia.
glauca
lutea.
racemosa.
Wilsoni.

Corynephorus canescens.

Cosmidium Burridgeanum.

Cosmos diversifolius.

Cotula coronopifolia.

Crepis aurea.
blattarioides.
grandiflora.
pygmaea.
rubra.
sibirica.

Crocus asturicus.
aureus
chrysanthus.
hadriaticus.
Imperati.
longiflorus.
medius.
pulchellus.
Sieberi.
speciosus.
Tommasinianus.

Crucianella aegyptiaca.

Cyananthus lobatus.

Cynoglossum cheirifolium.
microglochin.
nervosum.
Wallichii

Cynosurus echinatus.

Dactylis altaica.
Aschersoniana.

Dahlia Merckii.
variabilis.

Dalea Lagopus.

Datisca cannabina.

Datura Tatula.

Delphinium Brunonianum.
caucasicum.
consolida.
decorum.
dyctiocarpum.
elatum.
formosum
Geyeri.
grandiflorum.
Maackianum.
occidentale.
pictum.
speciosum.
— var. glabratum.
trolliifolium.
vestitum.

Demazeria loliacea.

Deschampsia caespitosa.
tenella.

Desmodium canadense.

Deyeuxia Langsdorfii

Dianthus arenarius.
Armeria.
caesius.
callizonus.
capitatus.
Caryophyllus.
cruentus.
deltoides.
fragrans.
gallicus.
giganteus.
hirtus.
leptopetalus.
liburnicus.
neglectus
petraeus.
Requienii.
Seguieri.
squarrosus.
subacaulis.
superbus.
Waldsteinii.

Diascia Barberae.

Dictamnus albus.

Digitalis ambigua.
lanata.

Dimorphotheca aurantiaca.
hybrida.
pluvialis.
sinuata

Diplachne fasciculare.

Dipsacus asper.
atratus.
ferox.
inermis.
plumosus.

Dischisma spicatum.

Dodecatheon frigidum.
Hendersoni.
Meadia.

Doronicum corsicum.

Dorycnium herbaceum.
rectum.

Downingia elegans.

Draba aizoides.
altaica.
Athoa.
aurea.
Bertolonii.
carinthiaca.
cuspidata.
fladnizensis.
frigida.
grandiflora.
incana.
longirostra.
nivalis.
rigida.
Salomonii.

Dracocephalum heterophyllum.
Moldavica.
nutans.
peltatum.
peregrinum.
Ruyschiana.

Dulichium spathaceum.

Eeballium Elaterium.

Eccremocarpus scaber.

Echinacea purpurea.

Echinocystis fabacca.

Echinodorus ranunculoides.

Echinops dahuricus.
Ritro.
sphaerocephalus.

Elsholtzia cristata.

Elymus giganteus.
virginicus.

Emilia flammea.

Encelia calva.

Epilobium Dodonaei.
limnaeoides.
luteum.
macropus.
nummularifolium.

Epipactis palustris.

Eragrostis abyssinica.
maxima.

Eranthis cilicica.

Eremostachys laciniata.

Erigeron alpinus.
aurantiacus.
Coulteri.
glabellus.
glaucus.
grandiflorus.
macranthus.
multiradiatus.
neomexicanus.
salsuginosus.

Erinus alpinus.

Eriogonum flavum.

Eriophyllum caespitosum.

Erodium amanum.
Botrys.
carvifolium.
macradenum.
malacoides.
Manescavii.
petraeum.
Salzmanni.
trichomanefolium.

Eruca sativa.

Eryngium agavefolium.
alpinum.
amethystinum.
Bourgati.
giganteum.
glaciale.
multifidum.
planum.
Serra.
spinalba.

Erysimum Perofskianum.
rupestre.

Erythraea Massoni.

Erythronium californicum.
citrinum.
Hartwegii.
revolutum.

Eschscholzia caespitosa.
californica.
Douglasii.

Eucharidium Breweri.
concinnum.

Eupatorium ageratoides.
purpureum.

Euphorbia Heldreichii.
Kotschyana.
Lathyris.

Felicia tenella.

Ferula tingitana.

Festuca gigantea.
heterophylla.
Myuros.
Poa.
rigida.
vaginata.

Fragaria Daltoniana.
indica.

Fritillaria citrina.
lutea.
tenella.

Galactites tomentosa.

Galax aphylla.

Galega orientalis.
patula.

Galeopsis Ladanum.
Tetrahit.

Galium thymifolium.

Gastridium australe.

Gazania pygmaea.

Gentiana asclepiadea.
— var. alba.
Cruciata.
dahurica.
decumbens.
Freyniana.
septemfida.
straminea.
tibetica.

Geranium albiflorum.
armenum.
eriostemon.
Fremonti.
grandiflorum.
ibericum.
incisum.
macrorrhizum.
nepalense.
rivulare.
sessiliflorum.
yedoense.

Gerbera Anandria.
nivea.

Geum album.
chiloense.
coccineum.
Heldreichii.
montanum.
Rossii.
triflorum.

Gilia achilleaefolia.
androsacea.
—var. alba.
capitata.
Gilia —*cont.*
coronopifolia.
densiflora.
liniflora.
micrantha.
multicaulis.
squarrosa.
tricolor.

Gillenia trifoliata.

Glaucium corniculatum.
—var. tricolor.
leiocarpum.

Glyceria distans.

Grindelia cuneifolia.
robusta.

Gypsophila acutifolia.
elegans.
Gmelinii.
muralis.
paniculata.
prostrata.
Steveni.

Hastingsia alba.

Hebenstretia tenuifolia.

Hedysarum esculentum.
flavescens.
humile.
Semenovii.

Helenium Bigelovii.
Hoopesii.

Helianthemum Tuberaria.

Helianthus cucumerifolius
Nuttallii.
occidentalis.

Helichrysum bellidioides.
bracteatum.

Heliophila pilosa.

Helipterum corymbosum.
roseum.

Heracleum Mantegazzianum.
persicum.
pyrenaicum.

Hesperis matronalis.

Heuchera Drummondi.
foliosa.

Hibiscus Trionum.

Hieracium alpinum.
amplexicaule.
Auricula.
Bornmülleri.
Grisebachii.
Heldreichii.
lanatum.
pannosum.
villosum.

Hilaria rigida.

Hordeum bulbosum.
maritimum.

Horminum pyrenaicum.

Hymenophysa pubescens.

Hyoscyamus albus.
aureus.

Hypecoum grandiflorum.
procumbens.

Hypericum Ascyrum.
confertum.
Coris.
empetrifolium.
hirsutum.
linarifolium.
nummularium.
olympicum.
tomentosum.

Hypochaeris glabra.
uniflora.

Iberis Amara.
Jordani.
Lagascana.

Impatiens amphorata.
scabrida.

Inula barbata.
brittanica.
ensifolia.
Hookeri.
macrocephala.
orientalis.
racemosa.
Royleana.
spiraeafolia.
squarrosa.

Iris bucharica.
caroliniana.
chrysographis.
Douglasiana.
juncea.
Leichtlini.
longipetala.
missouriensis.
setosa.
tingitana.

Isatis glauca.

Jasione perennis.

Jasonia tuberosa.

Juncus alpinus.
Chamissonis.
triglumis.

Jurinia cyanoides.

Kitaibelia vitifolia.

Kochia trichophila.

Koeleria albescens.
phleoides.
splendens.

Lactuca Bourgaei.
macrophylla.
perennis.

Lagascea mollis.

Lagurus ovatus.

Lallemantia canescens.
iberica.

Lathyrus angulatus.
Aphaca.
articulatus.
cirrhosus.
Clymenum.
grandiflorus.
luteus.
maritimus.
Nissolia.
Ochrus.
pisiformis.
polyanthus.
rotundifolius.
setifolius.
tingitanus.
tuberosus.
undulatus.
variegatus.
venosus.

Lavatera cachemiriana.
trimestris.
— var. alba.

Layia elegans.
platyglossa.

Leonurus Cardiaca.
sibiricus.
tataricus.

Leptosyne Douglasii.
maritima.
Stillmanni.

Leuzea conifera.
longifolia.

Liatris spicata.

Libertia ixioides.

Ligusticum alatum.
pyrenaicum.
scoticum.

Lilium Parryi.
parvum.
pyrenaicum.
sutchuenense.

Limnanthes alba.

Linaria anticaria.
aparinoides.
bipartita.
dalmatica.
macedonica.
maroccana.
multipunctata.
origanifolia.
sapphirina.
saxatilis.
triphylla.
tristis.
viscida.

Linum angustifolium.
capitatum.
monogynum.
nervosum.
salsoloides.
usitatissimum.

Lippia nodiflora.

Lobelia linnaeoides
sessilifolia.
syphilitica.

Lonas inodora.

Lotus Requienii.
Tetragonolobus.

Lunaria annua.

Lupinus angustifolius.
concinnus.
densiflorus.
Douglasii.
elegans.
Hartwegii.
micranthus.
mutabilis.
nanus.
pubescens.

Luzula Hosti.
nivea.

Lychnis alpina.
chalcedonica.
Flos-jovis.
fulgens.
Lagascae.
Preslii.
Sartori.

Lycurus phleoides.

Lysimachia barystachys.
clethroides.
davurica.
punctata.
violascens.

Madia dissitiflora.
elegans.
sativa.

Malcolmia africana.
chia.
maritima.

Malope trifida.

Malva Alcea.
moschata.
oxyloba.
parviflora.

Malvastrum limense.

Matthiola bicornis.
sinuata var. glabra
albiflora.
tricuspidata.

Meconopsis aculeata.
cambrica.
heterophylla.
integrifolia.
paniculata.
racemosa.
rudis.
sinuata var. latifolia.
Wallichii.

Medicago Echinus.
Helix.
hispida.
littoralis.
Murex.

Medicago—*cont.*
orbicularis.
scutellata.
turbinata.

Melica altissima.
ciliata.

Melilotus alba.

Mimulus cardinalis.
Lewisii.
luteus.

Mirabilis divaricata.
Jalapa.
longiflora.

Molinia coerulea.

Molopospermum cicutarium.

Monarda didyma.
fistulosa.

Monolepis trifida.

Muhlenbergia mexicana.

Muscari armeniacum.
compactum.
neglectum.
paradoxum.
parviflorum.
pulchellum.

Myosurus minimus.

Myriactis Gmelini.

Nardus stricta.

Nemesia floribunda.

Nepeta caesarea.
concolor.
discolor.
macrantha.
nuda.
Sibthorpii.

Nicandra physaloides.

Nicotiana affinis.
Langsdorffii.
paniculata.
rustica.
Sanderae.
Tabacum.

Nigella corniculata.
damascena.
hispanica.

Oenothera albicaulis.
amoena.
densiflora.
Romanzowii.
riparia.
rosea.
tenella.
triloba.

Omphalodes linifolia.

Ononis alopecuroides.
natrix.

Onopordon Acanthium.
arabicum.
bracteatum.

Ornithogalum narbonense.

Oryzopsis miliacea.

Oxyria digyna.

Paeonia arietina.
decora var. alba.
microcarpa.
mollis.
paradoxa.
peregrina.
tenuifolia.
Veitchii.
Wittmanniana.

Panicum capillare.

Papaver alpinum.
Argemone.
commutatum.
glaucum.
laevigatum.
lateritium.

Papaver—*cont.*
nudicaule.
orientale.
pavoninum.
rupifragum.
somniferum.

Paradisia Liliastrum.

Parrya Menziesii.

Patrinia heterophylla.

Peltaria alliacea.

Pennisetum macrourum.

Pentstemon acuminatus.
arizonicus.
barbatus.
campanulatus.
confertus.
deustus.
diffusus.
gentianoides.
glaucus.
gracilis.
heterophyllus.
humilis.
isophyllus.
Menziesii var. Scouleri.
ovatus.
pubescens.
secundiflorus.
virgatus.

Petunia nyctaginiflora.

Phacelia campanularia.
congesta.
malvaefolia.
tanacetifolia.
viscida.
Whitlavia.

Phalaris minor.
paradoxa.
tuberosa.

Phleum arenarium.
asperum.
Michelii.
Boehmeri.

Phlomis cashmiriana.
pratensis.
tuberosa.
umbrosa.
viscosa.

Phlox glaberrima.

Physalis Alkekengi.
Bunyardi.
Francheti.
ixiocarpa.

Physochlaina orientalis.

Physospermum cornubiense.

Physostegia virginiana.

Phyteuma carescens.
Michelii.
orbiculare.
Scheuchzeri.
serratum.
spicatum.

Phytolacca acinosa.
decandra.

Plantago Candollei.
Coronopus.
Cynops.
maritima.
Myosurus.
ovata.
Psyllium.

Platycodon glaucum.
grandiflorum.
— var. Mariesii.

Platystemon californicus.

Plectranthus glaucocalyx.

Pleurospermum Golaka.

Plumbago micrantha.

Poa abyssinica
caesia.
violacea.

Podolepis chrysantha.

Podophyllum Emodi.

Polemonium flavum.
grandiflorum.
humile.
mexicanum.
pauciflorum.

Polycalymna Stuartii.

Polygonum affine.
alpinum.
Emodi.
Laxmanni.
rude.
viviparum.

Polypogon littoralis.
maritimus.
monspeliensis.

Portulaca grandiflora.

Potentilla arguta.
argyrophylla.
calycina.
crinita.
dealbata.
Detommasii.
Fenzlii.
glandulosa.
gracilis.
Herbichii.
Hippiana.
Meyeri.
mollis.
montenegrina.
multifida.
nepalensis.
nevadensis.
norvegica.
pennsylvanica.
recta.
rivale.
rupestris.
semilaciniata.
sericea.
tanacetifolia.
Thurberi.

Poterium tenuifolium.

Pratia angulata.

Prenanthes altissima.
purpurea.

Primula angustidens.
Beesiana.
Bulleyana.
capitata.
farinosa.
frondosa.
involucrata.
longiflora.
malacoides.
mollis.
Palinuri.
pulverulenta.
saxatilis.
verticillata.
Wardii.

Psoralea acaulis.
macrostachya.
physodes.

Pycnanthemum pilosum.

Ramondia pyrenaica.

Ranunculus chaerophyllus.
Nyssanus.

Rehmannia angulata.

Reseda virgata.

Rhagadiolus edulis.

Rheum Webbianum.

Rodgersia aesculifolia.
pinnata.
podophylla.

Roemeria hybrida.

Romulea candida.
speciosa.

Rudbeckia amplexicaulis.
californica.
maxima.
speciosus.
subtomentosa.

Rumex maximus.
orientalis.
salicifolius.
sanguineus.

Salvia argentea.
Bertolonii.
carduacea.
Columbariae.
globosa.
grandiflora.
Horminum.
japonica.
Przewalskyii.
Schiedeana.
Sclarea.
taraxifolia.
tiliaefolia.
verticillata.
virgata.
viridis.

Sambucus Ebulus.
— var. latifolius.

Sanicula marylandica.

Saponaria ocymoides.
Vaccaria.
Wienmanni.

Saussurea albescens.
alpina.
discolor.
hypoleuca.
salicifolia.

Saxifraga ambigua.
bronchialis var. cherle-
rioides.
caespitosa.
cernua x granulata.
cochlearis.
— var. minor.
decipiens.
granulata.
Hausmanni.
latepetiolata.
lingulata var. lantoscana.
luteo-viridis.
montavoniensis.
mutata.
pedemontana.

Saxifraga—*cont.*
rotundifolia.
sponhemica.
tellimoides.
trifurcata.
virginiensis.

Scabiosa brachiata.
caucasica var. connata.
fumarioides.
graminifolia.
gramuntia.
Kitaibelii.
longifolia.
Olgae.
Pterocephala.
vestina.

Schizanthus Grahami.
pinnatus.
retusus.

Scilla autumnalis.
monophyllos.
verna.

Scopolia lurida.
sinensis

Scorpiurus vermiculata.

Scorzonera purpurea.

Scrophularia nodosa.
Scorodonia.

Scutellaria altissima.
baicalensis.
indica var. japonica.
lateriflora.
orientalis.
Tourneforti.

Securigera Coronilla.

Sedum alsinaefolium.
altissimum.
Ewersii.
heterodontum.
maximum.
spathulifolium.
ternatum.

Selinum serbicum.

Senecio abrotanifolium.
adonidifolium.
Clivorum.
Doria.
Doronicum.
elegans.
Ledebouri.
Ligularia
nemorensis.
Saxifraga.
squalidus.
stenocephalus.
suaveolens.
tanguticus.
umbrosus.
Wilsonianus.

Serratula atriplicifolia.
Gmelinii.
quinquefolia.
tinctoria.

Seseli elatum.
glaucum.
Libanotis.

Sesleria argentea.

Setaria glauca.
italica.

Sidalcea candida.
Listeri.
malvaeflora.
neo-mexicana.
spicata.

Siderites scordiodes.

Siegesbeckia orientalis.

Silene alpestris.
Armeria.
asterias.
chloraefolia.
ciliata.
colorata.
conoidea.
cretica.
echinata.
elegans.

Silene—*cont*
Fortunei.
fruticulosa.
fuscata.
italica.
linicola.
longicilia.
melandrioides.
Muscipula.
noctiflora.
nocturna.
Otites.
paradoxa.
pendula.
quadrifida.
Reichenbachii.
rupestris.
Saxifraga.
sedoides.
Sendtneri.
squamigera.
tatarica.
tenuis.
vallesia.
verecunda.
Zawadskii.

Silphium Asteriscus.
integrifolium.
scaberrimum.
trifoliatum.

Silybum eburneum.
Marianum.

Sisymbrium strictissimum.

Smyrnium Olusatrum.

Specularia hybrida.
pentagonia.
perfoliata.
Speculum.

Sporobolus cryptandrus.

Stachys Alopecuros.
annua.
arenaria.
citrina.
glutinosa.
graeca.
grandiflora.
longifolia.

Statice bellidifolia.
latifolia.
Suwarowii.
tatarica.

Steironema ciliatum.

Stipa Calamagrostis.
capillata.
papposa.
pennata.
spartea.

Swertia Hookeri.
longifolia.
perennis.

Symphyandra Hofmanni.
pendula.
Wanneri.

Symphytum asperrimum.

Synthyris reniformis.
rotundifolia.

Telephium Imperati.

Tellima grandiflora.

Teucrium canadense.
flavum.
multiflorum.
Scorodonia.

Thalictrum angustifolium.
aquilegifolium.
calabricum.
corynellum.
cultratum.
dioicum.
Fendleri.
squarrosum.

Thermopsis fabacea.
lanceolata.

Thlaspi densiflorum.

Thymus odoratissimus.

Tolpis barbata.
coronopifolia.

Tiarella polyphylla.

Tragopogon balcanicus.
major.

Trachymene coerulea.

Trautvetteria palmata.

Tricholepis furcata.

Trifolium alpestre.
badium.
elegans.
incarnatum.
Johnstoni.
Lupinaster.
medium.
ochroleucum.
pannonicum.
parviflorum.
physodes.
resupinatum.
rubens.
scabrum.

Trigonella coerulea.
corniculata.
cretica.
Foenum-graecum.
polycerata.
radiata.

Trillium grandiflorum.
ovatum.
stylosum.

Trollius altaicus.
americanus.
asiaticus.
Ledebouri.
sinensis.

Tulipa Batalini.
chrysantha.
dasystemon.
Kaufmanniana.
linifolia.
Sprengeri.

Tunica Saxifraga.

Ursinia pulchra.

Urtica pilulifera.

Valerianella Auricula.
carinata.
coronata.
dentata.
echinata.
eriocarpa.
vesicaria.

Verbascum Blattaria.
giganteum.
gnaphaloides.
leianthum.
Lychnites.
olympicum.
phoeniceum.

Verbena Aubletia.
bonariensis.
erinoides.

Verbesina encelioides.
helianthoides.
Purpusii.

Veronica austriaca.
crassifolia.
gentianoides.
grandis.
incana.
longifolia.
Lyallii.
monticola.
orientalis.
Ponae.
saxatilis .
spicata.
— var. hybrida.
virginica.
— var. japonica.

Vesicaria sinuata.
utriculata.

Vicia angustifolia.
atropurpurea.
calcarata.
fulgens.

Vicia—*cont.*
melanops.
Orobus.
pisiformis.
pyrenaica.
sicula.
sylvatica.
unijuga.
villosa.

Vincetoxicum fuscatum.

Viola bosniaca.
cornuta.
gracilis.
lutea.
palustris.
persicifolia.
Rothomagensis.
Wahlenbergia dalmatica.
vincaeflora.

Xanthocephalum gymnospermoides.

Zizania aquatica.

Zosimia absinthifolia.

Zygadenus elegans.

TREES AND SHRUBS.

Those marked with an asterisk were not grown at Kew.

Acanthopanax divaricatum.
sessiliflorum.

Acer circinatum.
glabrum.
Heldreichii.
macrophyllum.
nikoense.
tetramerum.
Trautvetteri.

Aesculus indica.

Ailanthus glandulosa.

Alnus barbata.
cordifolia.
elliptica.
firma.
incana.
japonica.
mollis.
nitida.
oregona.
orientalis.
serrulata.
sitchensis.
Spaethii.
subcordata.
tenuifolia.
— var. Purpusii.
viridis.

Amelanchier vulgaris.

Aralia chinensis.

Arctostaphylos Manzanita.

Berberis aggregrata.
angulosa.
Aquifolium.
aristata.
brevipedunculata.
concinna.
Darwinii.
diaphana.
Berberis—*cont.*
dictyophylla.
Gagnepainii.
Hookeri var. viridis.
japonica var. Bealei.
polyantha.
Stapfiana.
subcaulialata.
Thunbergii.
umbellata.
Vilmoriniana.
virescens.
Wilsonae.
yunnanense.

Betula
alnoides var. pyrifolia.
coerulea.
Ermani.
— var. nipponica.
fruticosa.
glandulosa.
humilis.
lenta.
lutea.
occidentalis.
papyrifera.
populifolia.
pumila.

Bruckenthalia spiculifolia.

Bryanthus empetriformis.

Buddleia albiflora.
japonica.
nivea.
variabilis.
— var. Veitchiana.

Calophaca wolgarica.

Caragana arborescens.
— var. Redowskii.
aurantiaca.
frutescens.

Carmichaelia flagelliformis.

Carpinus caroliniana.
polyneura.

Cassinia fulvida.

Castanopsis chrysophylla.

Catalpa bignonioides.
speciosa.

Ceanothus americanus.
dentatus.
Fendleri.
integerrimus.
thyrsiflorus.
velutinus.

Cedrus atlantica var. glauca.

Celastrus articulatus.
flagellaris.
scandens.

Celtis occidentalis.

Cephalotaxus drupacea.
Fortuni.
pedunculata.

Cercis Siliquastrum.

Chionanthus virginica.

Cistus albidus.
crispus.
florentinus.
hirsutus.
laurifolius.
monspeliensis.
salvifolius.
villosus.

Cladrastis amurensis.

Clematis aethusifolia var.
latisecta.
campaniflora.
coccinea.
Davidiana.
Flammula.
fusca.

Clematis—*cont.*
globosa.
heracleaefolia.
integrifolia.
intermedia.
ligusticifolia.
mandshurica.
montana.
— var. rubens.
Pitcheri.
Pseudo-flammula.
Rehderiana.
songarica.
tangutica.
Veitchiana.
vernalis
Viticella.

Clerodendron Fargesii.
trichotomum.

Clethra alnifolia.
canescens.

Cocculus trilobus.

Colutea arborescens.
bullata.
cilicica.
longialata.
media.
orientalis.

Coriaria japonica.

Cornus alba.
Baileyi.
glabrata.
Kousa.
macrophylla.
Nuttallii.
pubescens.

*Corokia buddleoides.

Cotoneaster acutifolia
— var. villosula.
affinis.
amoena.
applanata.
bacillaris.

Cotoneaster—*cont.*
bullata.
buxifolia.
divaricata.
Fontanesii.
foveolata.
Franchetii.
frigida.
Henryana.
horizontalis.
humifusa.
integerrima.
Lindleyi.
lucida.
microphylla.
multiflora.
— var granatensis.
Nummularia.
pannosa.
rotundifolia.
salicifolia var. rugosa.
Simonsii.
thymifolia.
uniflora.
Zabelii.

Crataegus acclivis.
altaica.
atrorubens.
Azarolus.
Boyntonii.
Buckleyi.
canadensis.
Carrierei.
chlorosarca.
coccinea.
cordata.
Crus-galli.
cuneata.
Dippeliana.
dsungarica.
durobrivensis.
elongata.
elliptica.
Ellwangeriana.
flava.
foetida.
Forbesae.
Jackii.
Laurentiana.
lobata.
macracantha.
melanocarpa.

Crataegus—*cont.*
mexicana.
modesta.
mollis.
nigra.
orientalis.
Peckii.
pentagyna.
pentandra.
pinnatifida.
praecox.
prunifolia.
punctata.
tanacetifolia.
tomentosa.
Vailiae.

*Cryptomeria japonica.

Cupressus Goveniana.
Lawsoniana.
nootkatensis.
obtusa.
sempervirens.
*thurifera.
thyoides.
torulosa.

Cydonia cathayensis.
Maulei.

Cytisus albus.
biflorus.
capitatus.
decumbens.
Heuffeli.
hirsutissimus.
leucanthus.
nigricans.
— var. Carlieri.
praecox.
purgans.
purpureus.
Rochelii.
scoparius var. Andreanus.
— var. flore albo.
sessilifolius.

Daboëcia polifolia.

Desmodium canadense.
tiliaefolium.

Deutzia corymbosa.
crenata.
cuneata.
globosa.
longifolia.
reflexa.
scabra.
Sieboldiana.
Vilmoriniana.
Wilsonii.

Diervilla rivularis.
sessilifolia.

Diospyros Lotus.

Dipelta ventricosa.

Dorycnium hirsutum.

Elaeagnus multiflora.
umbellata.

Eleutherococcus Henryi.
leucorrhizus.
scaberulus.
Simonii.

Enkianthus campanulatus.
himalaicus.

Erica scoparia.
stricta.

Eucryphia pinnatifolia.

Euonymus americanus.
Bungeanus.
latifolius.
oxyphyllus.
planipes.
yedoensis.

Exochorda Alberti.

Fatsia japonica.

Fraxinus Ornus.

Garrya elliptica.

Gaultheria procumbens.
Shallon.

Genista aethnensis.
germanica.
hispanica.
radiata.
sagittalis.
tinctoria.
— var. elatior.
virgata.

Halesia hispida.
tetraptera.

Hamamelis japonica.
— var. Zuccariniana.
mollis.

Hedysarum multijugum.

Helianthemum alyssoides.
formosum.
polifolium.
vineale.

Hippophaë rhamnoides.

Hydrangea aspera.
Bretschneideri.
petiolaris.
vestita.

Hypericum Androsaemum.
Ascyron.
aureum.
Buckleii .
elatum.
patulum.
— var. Henryi.

Ilex opaca.
Sieboldii.
verticillata.

Indigofera Gerardiana.

Jamesia americana.

Jasminum fruticans.
humile.

Juglans nigra.

Kalmia cuneata.
glauca.
latifolia.

Ledum latifolium.

Leucothoë Catesbaei.

Leycesteria formosa.

Ligustrum Delavayanum.

Lonicera alpigena.
deflexicalyx.
dioica.
gynochlamydea.
Henryi.
iberica.
involucrata.
Kesselringii.
Maackii.
Morrowi.
obovata.
orientalis.
ovalis.
segreziensis.
translucens.
Xylosteum.

Lupinus arboreus.

Lycium chinense var. carnosum
Grevilleanum.
pallidum.

Lyonia ligustrina.

Magnolia Lennei.
Soulangiana.

Menziesia globularis.

Myricaria germanica.

Neillia amurensis.
capitata.
opulifolia.
Ramuleyi.
stellata.
Torreyi.

Nesaea salicifolia.

Notospartium Carmichaeliae.

Nuttallia cerasiformis.

Olearia Haastii.

Ononis arragonensis.
fruticosa.

Paliurus australis.

Pernettya mucronata.

Pertya sinensis.

Petteria ramentacea.

Phellodendron chinense.
japonicum.

Philadelphus brachybotrys.
californicus.
Gordonianus.
latifolius.
Lewisii.
tomentosus.

*Picea rubra.

Picrasma quassoides.

Pieris floribunda.
formosa
japonica.
mariana.

Pinus contorta.
Jeffreyi.
monticola.
muricata.
ponderosa.
Strobus.

Piptanthus nepalensis.

Platanus orientalis.

Potentilla fruticosa.

Prunus acida var. semperflorens.
cornuta.
Cuthbertii.
Maximowiczii.
Sargentii.

Ptelea trifoliata.

Pyracantha crenulata.

Pyrus alnifolia.
alpina.
americana.
cordata.
crataegifolia.
elaeagrifolia.
Hostii.
intermedia.
lobata.
Meinichii.
Michauxi.
minima.
Niedzwetzkyana.
nigra.
nivalis.
orientalis.
pekinensis.
pinnatifida.
prunifolia.
Ringo.
rotundifolia.
sambucifolia.
Sargentii.
Schiedeckeri.
sikkimensis.
sinaica.
Sorbus.

Quercus castanaefolia.

Raphiolepis japonica.

Rhamnus cathartica.
davurica.
Delavayana.
Erythroxylon.
fallax.
Frangula.
Purshiana.
spathulifolia.

Rhododendron ambiguum.
Benthamianum.
catawbiense.
ferrugineum.
lepidotum.
racemosum.
Vaseyi.

Rhodotypos kerrioides.

Ribes alpinum.
amictum.
cruentum.
mogollonicum.
petraeum.
stenocarpum.

Robinia Kelseyi.

*Rosa alpina.
Fendleri.
Hugonis.
Moyesii.
pisocarpa.
rubrifolia.
sericea.
sertata.
Soulieana.
Webbiana.

Rubus biflorus var. quinqueflorus.
flosculosus.
Giraldianus.
Kuntzeanus.
lasiostylus.
nigro-baccus.
omiensis.
parvifolius.
phoenicolasius.
pubescens.
xanthocarpus.

Ruta graveolens.

Sciadopitys verticillata.

Securinega fluggeoides.
ramiflora.

Skimmia japonica.
Laureola.

Sophora viciifolia.

Spartium junceum.

Spiraea Aitchisoni.
arborea var. glabrata.
arcuata.
assurgens.
brachybotrys
bracteata.

Spiraea—*cont.*
discolor.
expansa.
fastigiata.
Lindleyi.
Nobleana.
salicifolia.
sorbifolia.
stellipila.
trilobata.
Veitchii.

Staphylea colchica.
Coulombieri.
pinnata.
trifolia.

Stranvaesia undulata.

Styrax japonicum.

Symphoricarpus Heyeri.
mollis.
racemosus.

Syringa Emodi.
pekinensis.

Taxus cuspidata.

Thuya orientalis.

Tilia argentea.
cordata.
dasystyla.
orbicularis.
platyphyllos.

*Tricuspidaria lanceolata.

Ulex Gallii.

Vaccinium corymbosum.
erythrocarpum.
hirsutum.
pallidum.

Veronica carnosula.

Viburnum cotinifolium.
dilatatum.
Henryi.
Lantana.
Lentago.
lobophyllum.
Opulus.
phlebotrichum.
pubescens.
rhytidophyllum.
tomentosum.
venosum.

Vitis orientalis.

Zanthoxylum Bungei.

Zenobia speciosa.
— var. pulverulenta.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX II.—1915.

NOTE.

In the preface to the *Catalogue of the Library of the Royal Botanic Gardens*, which was issued as Volume III. of the *Additional Series* of the *Kew Bulletin*, it was stated that annual lists of future additions would be published in the *Bulletin*.

The present instalment contains the additions made to the Library by gift or purchase during the year 1914, with the exception of such current periodicals and annuals as continue sets already catalogued.

Like the Catalogue, the List is printed on one side of the page to allow of its being cut up. It is probable that many persons and institutions will make the Kew Catalogue the basis of their own, and will use the lists of additions to supply printed slips for fresh titles.

(3677.) Wt. 225–595. 1,125. 3/15. J. T. & S. G. 14.

CATALOGUE OF THE LIBRARY.

Additions received or incorporated during 1914.

§ 1.—GENERAL.

Adams, T. W. The genus *Pinus*. A paper read before the Philosophical Institute of Canterbury. Christchurch, N.Z., 1907. 8vo.

Author.

Anderson Paul J., & H. W. Anderson. The Chestnut Blight Fungus and a related Saprophyte. (Penn. Chestn. Tree Blight Comm. Bull 4.) Harrisburg, Pa., 1913. 8vo.

Dep. Plant Pathol., Cornell Univ.

Arber, Agnes. Biography of Nehemiah Grew. See **Oliver, F. W.** Makers of British Botany. 1913.

Arber, Edward Alexander Newell. Plant Life in Alpine Switzerland, &c. London, 1910. 8vo.

Arber, E. A. N. A note on some Fossil Plants from the Kent Coal-field. (Geol. Mag. N. S., ix.) (London, 1912.) 8vo.

Clement Reid.

Argenta, Vicente Martín de. Album de la Flora médico-farmacéutica é industrial, indígena y exótica, &c. Madrid, 1862-64. 3 vols. 4to.

Armitage, J. Warren. See **Stevens, G. H., & J. W. A.** 1914.

Arnold Arboretum of Harvard University. Catalogue of the Library . . . compiled under the direction of Charles Sprague Sargent by Ethelyn Maria Tucker. Vol. i. Serial publications, authors and titles. (Publications of the Arnold Arboretum, n. 6.) Cambridge, Mass., 1914. 4to.

Director.

Australia. The Commonwealth of Australia. Federal handbook. See **British Association for the Advancement of Science.** 1914. § 3.

Bailey, Liberty Hyde. The Standard Cyclopedia of Horticulture, &c. Vol. i ii. New York and London, 1914 → la. 8vo.

Author.

Balfour, Isaac Bayley. A Sketch of the Professors of Botany in Edinburgh from 1670 until 1887. See **Oliver, F. W.** Makers of British Botany. 1913.

Barber, E. Flora der Oberlausitz. See **Goerlitz.** Naturf. Ges. Abh. xxii., xxiii., & xxvii. § 3.

Barber, E. *Rubus iseranus*, n. sp. See **Goerlitz.** Naturf. Ges. Abh. xxiii. § 3.

Barras de Aragón, Francisco de las. Excursiones y notas botánicas por la provincia de Cádiz. (Bol. R. Soc. Españ. Hist. Nat. 1913.) [Madrid] (1913.) 8vo.

Author.

Barras de Aragón, F. de las, & Gabriel Lupiáñez Estévez. Discursos leídos ante la Real Academia Sevillana de Buenas Letras en la recepción pública del Sr. D. Francisco de las Barras de Aragon el día 6 de Diciembre de 1914. Sevilla, 1914. 8vo.

F. de las Barras de Aragón.

Bates, John Mallory. On the Sedges of Nebraska (family Cyperceae). (Univ. Stud., Nebraska, xiv.) (Lincoln, Nebraska, 1914.) 8vo.

C. E. Bessey.

Bateson, William. Problem of Genetics. New Haven, U.S.A., & London, 1913. 8vo.

Baumgartner, Josef. Die ausdauernden Arten der Sectio *Eualyssum* aus der Gattung *Alyssum*. Teil 1–3. (Beilage z. Jahresb. N.-O. Land.-Lehrersem. Wiener-Neustadt, xxxiv.-xxxvi.) Wiener Neustadt, 1907–09. 8vo. Teil 4. (Jahresb. Kaiser Franz Josef Land. Gymn. Baden, xlviii.) Baden, 1911. 8vo.

Bean, William Jackson. Trees and Shrubs hardy in the British Isles. London, 1914. 2 vols. 8vo.

Sir Frank Crisp, Bart.

Beauvisage, Georges Eugène Charles. See **Guillaumin, A., & G. E. C. B.** 1914.

Beccari, Odoardo. Contributo alla conoscenza della Palma a Olio (*Elaeis guineensis*). (Agric. Col., viii.) Firenze, 1914. 8vo.

Director, R.B.G., Kew.

Becker, Wilhelm. Die Violen der Schweiz. (N. Denkschr. Schweiz. Naturf. Ges. xlv.) Basel, Genf, & Lyon, 1910. 4to.

Béguinot, Augusto. Flora Padovana ossia prospetto floristico e fitogeografico delle Piante vascolari indigene inselvatichite o largamente coltivate crescenti nella Provincia di Padova, &c. Padova, 1909–14. 8vo.

Béguinot, A. La Flora, il Paesaggio botanico e le Piante utili della Tripolitania e Cirenaica. Padova, 1912. 8vo.

Bennett, Charles L. See **Popenoe, P. B.** 1913.

Bennie, James, & J. A. Johnston. Remarks on two transverse sections of Carboniferous Wood from Baberton New Quarry, Midlothian. (Proc. R. Phys. Soc., Edinb. xii.) (Edinburgh, 1894.) 8vo.

Clement Reid.

Bergeret, Jean Pierre. Flore des Basses-Pyrénées par J. Bergeret, augmentée par Eugène Bergeret. Nouvelle édition . . . par Gaston Bergeret. Pau, 1909. 8vo.

Berkeley, Miles Joseph. Biography by G. Massee. See **Oliver, F. W.** Makers of British Botany. 1913.

Bernard, Charles. Verslag van eene reis naar Sumatràs O.-K. en de Padangsche Bovenlanden. See **Buitenzorg.** Dep. van Landbouw, &c. [1914.]

Berro, Mariano B. Las Gramineas de Vera. La enumeración, clasificación y utilización forrajera. Montevideo, 1906. 8vo.
Author.

Berro, M. B. La Agricultura colonial. Montevideo, 1914. 8vo.
Author.

Beyrodt, O. See **Schlechter, F. R. R.** 1914

Blakeney. Blakeney Point in 1913. Being: I. The Report of the Committee of Management. II. The Laboratory report (by F. W. Oliver.) Norwich, [1914.] 8vo.
F. W. Oliver.

Bobart, Jacob, *the Elder,* **& Bobart, Jacob,** *the Younger.* Biographical sketches. See **Vines, S. H., & G. C. Druce.** 1914.

Boldingh, I. Flora voor de Nederlandsch West-Indische Eilanden. (Kol. Inst., Amsterdam.) Amsterdam, 1913. 8vo.
Director, Bot. Gard., Utrecht.

Boldingh, I. The Flora of the Dutch West Indian Islands. ii. The Flora of Curaçao, Aruba and Bonaire. Leiden, 1914. 8vo.
Director, Bot. Gard., Utrecht.

Börgesen, Frederik C. E. The species of *Sargassum* found along the coasts of the Danish West Indies, with remarks upon the floating forms of the Sargasso Sea. (Mindeskrift for J. Steenstrup; Arb. Bot. Have Köbenh. n. 74.) Köbenhavn, 1914. 4to.
Author.

Bose, Jagadis Chunder. Researches on Irritability of Plants. London, etc., 1913. 8vo.

Bottomley, William Beecroft. Biography of Sir Joseph Henry Gilbert. See **Oliver, F. W.** Makers of British Botany. 1913.

Bower, Frederick Orpen. Biographies of Sir W. Hooker and Sir J. D. Hooker. **See Oliver, F. W.** Makers of British Botany. 1913.

Bradley, Henry. See **Murray, Sir J. A. H.** 1884 —

Braun, Josias. Die Vegetationsverhältnisse der Schneestufe in den rätisch-lepontischen Alpen. Ein Bild des Pflanzenlebens an seinen äussersten Grenzen. (N. Denkschr. Schweiz. Naturf. Ges. xlviii.) Basel, Genf & Lyon, 1913. 4to.

Briquet, John. Règles internationales de la Nomenclature botanique. Ed. 2. 1912. See **Brussels.** III. Congrès de Bot. 1910.

British Columbia. Botanical Office of the Province of British Columbia. First annual report, 1913, by J. Davidson. Victoria, B.C., 1914. 8vo.

Author.

Britten, James. The eighth Lord Petre. (Dublin Review, 1914.) [Dublin, 1914.] 8vo.

Author.

Brotherus, Victor Ferdinand. Die Laubmoose der deutschen Südpolar-Exped., 1901-3. See **Drygalski, E. von.** 1906-11.

Brotherus, V. F. Pflanzenphänologische Beobachtungen in Finland, 1909. (Bidr. Kämned. Finl. Nat. och Folk, lxxvi.) Helsingfors, 1914. 8vo.

Author.

Broun, A. F. Sylviculture in the Tropics. London, 1912. 8vo.

Director, R.B.G., Kew.

Brown, Nicholas Edward. Some notes on the structure of Diatoms. (Journ. Quekett. Micr. Club, xii.) London, 1914. 8vo.

Author.

Brown, Robert, *President of the Linnean Society.* Biography by J. B. Farmer. See **Oliver, F. W.** Makers of British Botany. 1913.

Brussels. III. Congrès internationale de Botanique, 1910. Règles internationales de la Nomenclature botanique adoptées par le Congrès international de Botanique de Vienne 1905. Deuxième édition mise au point d'après les décisions du Congrès international de Botanique de Bruxelles 1910, publiée . . . par J. B. (Title and text also in English and German.) Jena, 1912. 4to.

Budapest. Bot. Gard., &c. See **Gombocz, E.** 1914.

Burbank, Luther. Scientific aspects of L. Burbank's work. See **Jordan, D. S., & V. L. Kellog.** 1909.

Burbank, L. See **Harwood, W. S.** 1912.

Burrell, William Holmes. See **Nicholson, W. A.** 1914.

Burtt-Davy, Joseph. See **Davy, Joseph Burtt-.**

Caldas, Francisco José de. See **Mendoza, D.** 1909.

Camus, A. Les Cyprès (genre *Cupressus*): monographie, systématique, biologie, culture, principaux usages. Paris, 1914. 4to.

Carter, Humphrey G. Genera of British Plants, arranged according to Engler's Syllabus der Pflanzenfamilien . . . with the addition of the characters of the genera. Cambridge, 1913. 8vo.

Case, Gerald O. The use of Vegetation for reclaiming tidal lands. (Engineering, Aug. 22 & Sept. 12, 1913.) London, 1913. 8vo.

Chamberlain, Charles Joseph. See **Coulter, J. M., & C. J. C.** 1910.

Chipp, Thomas Ford. A list of Trees, Shrubs and Climbers of the Gold Coast, Ashanti and the Northern Territories. London, 1913. 8vo.

Crown Agents for the Colonies.

Chodat, Robert. Remarques sur quelques *Polygala* espagnols. (Bol. Soc. Aragon. Ciene. Nat. xii.) Zaragoza, 1913. 8vo.

Author.

Church, Arthur Herbert. A chemical study of vegetable albinism. [Pt. 1]–3. (Journ. Chem. Soc. 1879–86.) [London] (1879–86.) 8vo.

Author.

Clements, Frederic Edward, & Edith Schwartz Clements. Rocky Mountain Flowers. An illustrated guide for Plant-lovers and Plant-users. White Plains, N.Y., 1914. la. 8vo.

Coghlan, H. Lake, & J. W. Hinchley. Coconut cultivation and plantation machinery. London, 1914. sm. 8vo.

Crosby, Lockwood & Son.

Cogniaux, Alfred. Commissão de linhas telegraphicas estrategicas de Matto Grosso as Amazonas. Botanica. Parte III. Melastomataceas, Cucurbitaceas e Orchidaceas estudadas e determinadas pelo Dr. A. C. Traducção de F. C. Hoehne. Rio de Janeiro, 1912. 4to.

W. Botting Hemsley.

Conwentz, Hugo Wilhelm. Die Pflege der Naturdenkmäler im Walde. (Ber. VII. Haupt-versamml. Deutsch. Forstver.) Danzig, 1906. 8vo.

Clement Reid.

Conwentz, H. W. Die Pflege der Naturdenkmäler mit Berücksichtigung des Gartenbaues. Berlin, 1908. 8vo.

Clement Reid.

Copeland, Edwin Bingham. The Coconut. London, 1914. 8vo.

Macmillan & Co., Ltd.

Correns, Carl. Die neuen Vererbungsgesetze. . . . Zweite, ganz umgearbeitete Auflage der Vererbungsgesetze. Berlin, 1912. 8vo.

Cory, Reginald. The Horticultural Record, consisting of coloured and half-tone reproductions of the most interesting and valuable Flowers, Plants, Shrubs . . . exhibited at the Royal International Horticultural Exhibition, 1912, accompanied by contributions on the Progress of Horticulture, &c., compiled by R. C. London, 1914. 4to.

W. J. Bean.

Costa Rica. República de Costa Rica. Memoria de Fomento presentado al Congreso Constitucional por E. J. Núñez, 1912. San José, 1913. 8vo.

Coulter, John Merle, & Charles Joseph Chamberlain. Morphology of Gymnosperms. Chicago, 1910. 8vo.

Coutinho, Antonio Xavier Pereira. Notas da Flora de Portugal. 1. Paris, Lisboa, &c., 1914. 8vo.

Author.

Coutinho, A. X. P. Herbarii Gorgonei Universitatis Olisiponensis Catalogus (Arq. Univ. Lisboa, i.) Olisipone, 1914. 8vo.

Author.

Craigie, W. A. See **Murray, Sir J. A. H.** 1884 →

Crisp, Sir Frank, Bart. Guide for the use of visitors to Friar Park, Henley-on-Thames. (Abridged from the 4th edition.) [s.l.] 1914. 4to.

Miss M. Smith.

Crossland, Charles. See **Massee, G. E., & C. C.** 1905.

Cunningham, J. C. See **Pammel, L. H., & others.** The Weed Flora of Iowa. 1913.

Darbishire, Otto Vernon. Lichenes. (National Antarct. ["Discovery"] Exped. Nat. Hist. v.) [London], 1910. 4to.

Author.

Darlington, William. Biography. See **Chester County Historical Society.** Bulletin. § 3.

Darwin, Francis. Biography of Stephen Hales. See **Oliver, F. W.** Makers of British Botany. 1913.

Davidson, John. See **British Columbia.** Report of the Botanical Office. 1914.

Davis, Bradley Moore. A biological survey of the waters of Woods Hole and vicinity. Botany. See **United States.** Department of Commerce and Labor. Bureau of Fisheries. Bulletin. Vol. xxxi.

Davy, Joseph Burtt-. Maize: its history, cultivation, handling and uses, with special reference to South Africa. A text-book for farmers, etc. London, etc., 1914. 8vo.

De Wildeman, Émile. Notes sur des productions végétales tropicales. (Bull. Assoc. Planteurs de Caoutchouc.) Anvers, 1914. 8vo.

Director, R.B.G., Kew.

Dictionaries of Languages:—English. See **Murray, Sir J. A. H.** 1884 →

Dioscorides, Pedanios. Dyoscoridis exactissimi indagatoris fidelissimiq: scri| ptoris virtutu simpliciū medicinarū Liber. ccccccccxvii| continens capitula: cum nōnullis additionibus Pe|tri paduanēsis in margine libri notatis. Eiusdem Dyoscori|dis de naturis & virtutibus aquarum tractatus vnus. *From colophon*: impssus Lugduni | per Gilbertū de Villiers expēsis | Honestissimi viri Bartholomei | trot. Anno dñi. M.cccc.xii. die| vo. xxix. mensis Martii. 8vo.

Bentham Trustees.

Dodge, Charles K. Annotated list of Flowering Plants and Ferns of Point Pelee, Ont., and neighbouring districts. (Canada Geol. Surv. Mem. 54.) Ottawa, 1914. 8vo.

Director, Geol. Surv., Canada.

Dongen, J. van. Beknopt overzicht der meest gebruikte Geneesmiddelen in Nederlandsch Oost-Indie. (Kol. Inst. Amsterdam; Pharmac. Weekblad, 1913.) Dieren, 1913. 8vo.

Koloniaal Instituut, Amsterdam.

Druce, George Claridge. See **Vines, S. H., & G. C. D.** 1914.

Drummond, James Montagu Francis. See **Haberlandt, G.** 1914.

Drygalski, Erich von. Deutsche Südpolar-Expedition, 1901-03 . . . herausg. von E. v. D. Bd. viii. Botanik. Heft 1–3. Berlin, 1906–11. 4to. [*Contains*: Die Pilze, von P. Hennings; Die Flechten, von A. Zahlbruckner; Die Lebermoose, von V. Schiffner; Die Laubmoose, von V. F. Brotherus Die Gefässpflanzen, von H. Schenck; Die Vegetation der subantarktischen Inseln, &c., von E. Werth; Die Meeresalgen, von Th. Reinbold; Die Lithothamnien, von M. Foslie.]

[Duppa, Richard.] Elements of the Science of Botany as established by Linnaeus, &c. Ed. 3. London, 1810. 3 vols. 8vo.

Mrs. Luckhurst.

Dyer, Sir William Turner Thiselton-. On some ancient Plant-names. (Journ. Philology, xxxiii.) [London, 1914.] 8vo.

Author.

Dyer, Sir W. T. Thiselton-. Biography of Harry Marshall Ward. See **Oliver, F. W.** Makers of British Botany. 1913.

Dykes, William Rickatson. The genus *Iris*. Cambridge, 1913. fol.

Bentham Trustees.

Eala. Jardin botanique d'Eala, District de l'Equateur, Congo belge. Liste générale des Végétaux cultivés, 1911. Bruxelles, [1914?] 8vo.

Minister for the Colonies, Brussels.

Eckert, Max. Ueber die Erosion der Pflanzen in den Kalkgebirgen. See **Goerlitz.** Naturf. Ges. Abh. xxii. §3.

Elements of the Science of Botany. See **[Duppa, R.]** 1810.

Elfving, Fredrik Emil Wolmar. Untersuchungen über die Flechtengonidien. (Acta Soc. Sc. Fenn. xliv. 2.) Helsingfors, 1913. 4to.

Author.

Engler, Adolf. Ueber Herkunft, Alter und Verbreitung extremer xerothermer Pflanzen. (Sitzb. Preuss. Akad. Wiss. 1914.) (Berlin), 1914. la. 8vo

Author.

Estévez, Gabriel Lupiáñez. See **Barras de Aragón, F. de las, & G. L. E.** 1914.

Ewart, Alfred James. See **Pfeffer, W.** 1900-06.

Farmer John Bretland. Biography of Robert Brown. See **Oliver, F. W.** Makers of British Botany. 1913.

Favrat, Louis. See **Franzoni, A.** 1890.

Fawcett, William. The Banana: its cultivation, distribution and commercial uses. With an introduction by Sir Daniel Morris. London, 1913. 8vo.

Duckworth & Co.

Fischer, Eduard. Untersuchungen zur vergleichenden Entwicklungsgeschichte und Systematik der Phalloideen. III. Serie. (Denkschr. Schweiz. Naturf. Ges. xxxvi.) Basel, Genève & Lyon, 1900. 4to.

Flora Sibiriae et Orientis extremi. See **St. Petersburg.** Mus. Bot. Acad. Imp. 1913.

[**Forrest, George.**] Seeds of Plants found by G. Forrest, 1913-1914. [London, 1914.] sm. 8vo.

J. Williams.

Forti, Achille. Contribuzioni diatomologiche. (Atti R. Ist. Ven. Sc. lxxii.) Venezia, 1913. 8vo.

Author.

Foslie, Mikal Heggelund. Die Lithothamnien der deutschen Südpolar-Exped., 1901-03. See **Drygalski, E. von.** 1906-11.

Foster, William. The English Factories in India, 1642-45. Oxford, 1913, 8vo.—1646-50 Ib., 1914. 8vo.

Secretary of State for India.

Francé, R. H. Das Leben der Pflanze [herausg. von R. H. F.] Abteilung III. (=Bd. vi.)—1. Entwicklungsgeschichte der Pflanzenwelt, von W. Gothan.—2. Pflanzengeographie, von R. Pilger.—3. Die Pflanzenwelt der Tropen, von H. Winkler. Stuttgart, 1913. 8vo.

Franzoni, Alberto. Le Piante fanerogame delle Svizzera Insubrica. Enumeratio . . . per cura di A. F. Opera postuma ordinata e annotata da A. Lesticchia, con note ed aggiunte di L. Favrat. (Mem. Soc. Elvet. Sci. Nat. xxx.) Basilea, &c., 1890. 4to.

Freeman, William George. See **Stone, H., & W. G. F.** 1914.

Fries, Robert Elias. Wissenschaftliche Ergebnisse der schwedischen Rhodesia-Kongo-Expedition 1911-12 unter Leitung von Eric Graf von Rosen. Bd. i. Botanische Untersuchungen, Heft 1. Stockholm, 1914. 4to.

Author.

Fries, Thore C. E. Botanische Untersuchungen im nördlichsten Schweden. Ein Beitrag zur Kenntnis der alpinen und subalpinen Vegetation in Torne Lappmark. Akad. Abhandl. Uppsala & Stockholm, 1913. 8vo.

Botanical Museum, Upsala.

Fritsch, Felix Eugen, & Florence Rich. Studies on the occurrence and reproduction of British Freshwater Algae in nature. 3. (Ann. Biol. lacustre, vi.) Bruxelles, 1913. 8vo.

Author.

Fyson, Philip Furley. Madras Flowers. See **Madras.** Presidency College. Botanical Bulletin, Series A. § 3.

Gates, Reginald Ruggles. A cytological study of *Oenothera* mut. *lata* and *Oe.* mut. *semilata* in relation to mutation. (Quart. Journ. Micr. Sc. lix.) [London], (1914.) 8vo.

Author.

Gennadius, P. G. *Λεξικον φγτολογικον*, &c. Athens, 1914. 8vo.

Author.

Gentil, Louis. Quelques conseils pratiques pour le collecteur de Plantes vivantes, de Graines et de Spécimens d'Herbier. Renaix. 1904. 8vo.

Author.

Gilbert, Sir Joseph Henry. Biography by W. B. Bottomley. See **Oliver, F. W.** Makers of British Botany. 1913.

Glinka, K. Die Typen der Bodenbildung, ihre Klassifikation und geographische Verbreitung. Berlin, 1914. 8vo.

Gombocz, Endre. A Budapesti Egyetemi Botanikus kert és Tanszék Története. Historia Horti Botanici nec non Cathedrae Botanicae Regiae Scientiarum Universitatis Hungaricae Budapestinensis, 1770-1866. (With a French résumé.) Budapest, 1914. 8vo.

Direction, Bot. Gard., R. Hungarian Univ.

Gothan, Walther. Ueber eine wenig bekannte Fundamentaltatsache der Palaeobotanik. (Zeitschr. Deutsch. Geol. Ges. lxiv.) [Berlin] (1912.) 8vo.

Clement Reid.

Gothan, W. Die oberschlesische Steinkohlenflora. 1. Teil. Farne und farnähnliche Gewächse (Cycadofilices bezw. Pteridospermen). (Abh. K. Preuss. Geol. Landesanst. N. F. Heft 75.) Berlin, 1913. 8vo.

Clement Reid.

Gothan, W. See **Francé, R. H.** 1913.

Gredilla, Apolinar Federico. Apuntes para la Corografía botánica Vasco-Navarra. Barcelona, 1913. la. 8vo.

Greene, Edward Lee. Landmarks of botanical history. A study of certain epochs in the development of the science of Botany. Part I. Prior to 1562 A.D. (Smithsonian Misc. Coll. liv.) Washington, 1909. 8vo.

Director, R.B.G., Kew.

Grew, Nehemiah. Biography by A. Arber. See **Oliver, F. W.** Makers of British Botany. 1913.

Griffith, William. Biography by W. H. Lang. See **Oliver, F. W.** Makers of British Botany. 1913.

Groenland, Johannes. Atlas d'Histoire Naturelle. Végétaux. 53 planches . . . accompagnées d'un texte explicatif d'après Moritz Willkomm. Nouvelle édition. Paris, [s.a.] sm. fol.

Grove, William Bywater. The British Rust Fungi (Uredinales): their biology and classification. Cambridge, 1913. 8vo.

Gruen, Carl. Monographische Studien an *Treubia insignis* Goebel. Diss. (Flora, N. F., vi.) Jena, 1914. 8vo.

H Schinz.

Gubb, Alfred S. La Flore Saharienne: un aperçu photographique. Alger, &c., 1913. 8vo.

Guessow, Hans Theodor. Potato diseases transmitted by the use of unsound seed potatoes, with 12 coloured figures. (Canada, Dep. Agric. Farmers' Circ. 4.) Ottawa, 1914. 4to.

Author.

Guillaumin, André, & Beauvisage, Georges Eugène Charles. Species Montrouzieranae, seu Enumeratio Plantarum in Nova Caledonia terrisque adjacentibus a R. P. Montrouzier lectarum. (Ann. Soc. Bot. Lyon, xxxviii.) Lyon, 1914. 8vo.

Authors.

Haberlandt, Gottlieb. Physiological Plant Anatomy. Translated from the fourth German edition by Montagu Drummond. London, 1914. 8vo.

Hales, Stephen. Biography by F. Darwin. See **Oliver, F. W.** Makers of British Botany. 1913.

Hallier, Ernst. See **Koch, W. D. J.** 1878.

Hallier, Hans Gottfried. Ueber die Anwendung der vergleichenden Phytochemie in der systematischen Botanik. (11me Congr. Internat. de Pharmacie.) [La Haye, 1913.] 8vo.

Author.

Hallier, H. G. Der Stammbaum des Pflanzenreiches. (Extract from Reinhardt, Vom Nebelfleck zum Menschen. Ed. 2. Bd. ii-iii.) München, 1914. 8vo.

Author.

Harvey, William Henry. Biography by R. Ll. Praeger. See **Oliver, F. W.** Makers of British Botany. 1913.

Harwood, W. S. New Creations in Plant Life. An authoritative account of the Life and Work of Luther Burbank. Ed. 2. New York, 1912. 8vo.

Hauman-Merck, Lucien. Étude phytogéographique de la région du Rio Negro inférieur. (An. Mus. Nac. Hist. Nat. Buenos Aires, xxiv.) Buenos Aires, 1913. la. 8vo.

Author.

Hauman-Merck, L. Notes sur les Phytolaccacées Argentines. (An. Mus. Nac. Hist. Nat. Buenos Aires, xxiv.) Buenos Aires, 1913. la. 8vo.

Author.

Havre. Notice sur le Muséum d'Histoire Naturelle et d'Ethnographie du Havre en 1914. Le Havre, 1914. 8vo.

Director.

Hayden, Ada. See **Pammel, L. H., & others.** The Weed Flora of Iowa. 1913.

Hayek, August von. Die Pflanzendecke Oesterreich-Ungarns. Bd. i. Lfg. 1. Leipzig & Wien, 1914 —. 8vo.

Heer, Oswald. Beiträge zur Kreide-Flora, I-II. (N. Denkschr. Schweiz. Naturf. Ges. xxiii-xxiv.) Zürich, 1869-71. 4to.

Heldreich, Theodor von. Chloris Homerike. Athen, 1896. 8vo.

Henfrey, Arthur. Biography by F. W. Oliver. See **Oliver, F. W.** Makers of British Botany. 1913.

Hennings, Paul. Die Pilze der deutschen Südpolar-Exped., 1901-03. See **Drygalski, E. von.** 1906-11.

Henslow, George. Biography of John Stevens Henslow. See **Oliver, F. W.** Makers of British Botany. 1913.

Henslow, John Stevens. Biography by G. Henslow. See **Oliver, F. W.** Makers of British Botany. 1913.

Heurck, Henri van. Synopsis des Diatomées de Belgique. Texte. Anvers, 1885. 8vo.

Hickling, George. The Anatomy of *Calamostachys Binneyana*, Schimper. (Mem. & Proc. Manch. Lit. & Phil. Soc. liv.) Manchester, 1910. 8vo.

Clement Reid.

Hill, John. Biography by T. G. Hill. See **Oliver, F. W.** Makers of British Botany. 1913.

Hill, Thomas George. Biography of John Hill. See **Oliver, F. W.** Makers of British Botany. 1913.

Himmelbaur, Wolfgang. Die Berberidaceen und ihre Stellung im System: eine phylogenetische Studie. (Denkschr. Akad. Wien, lxxxix.) Wien, 1913. 4to.

Hinchley, J. W. See **Coghlan, H. L., & J. W. H.** 1914.

Hooker, Sir Joseph Dalton. Biography by F. O. Bower. See **Oliver, F. W.** Makers of British Botany. 1913.

Hooker, Sir William Jackson. Biography by F. O. Bower. See **Oliver, F. W.** Makers of British Botany. 1913.

Horwood, Arthur Reginald. The Fossil Flora of the Leicestershire and South Derbyshire Coalfield, and its bearing on the age of the Coal-Measures. (Trans. Leicester Lit. & Phil. Soc. xii.) Leicester, (1908.) 8vo.

Clement Reid.

Howard, Albert, & Howard, Gabrielle L. C. The improvement of Indigo in Bihar; with notes on drainage and on green-manuring. (Bihar Planters' Assoc.) Calcutta, 1914. 8vo.

Authors.

Hutton, J. Arthur. The effect of the war on Cotton-growing in new fields. (Journ. Textile Inst. 1914.) Manchester, (1914.) 8vo.

Sec., Brit. Cotton-Growing Assoc.

Iltis, Hugo. Ueber das Gynophor und die Fruchtausbildung bei der Gattung *Guaiacum*. (Sitzb. Akad. Wien, cxxii.) Wien, 1913. 8vo.

Istvánffi de Csik Madéfalva, A. Gyula, & Gy. Pálinkás. Études sur le Mildiou de la Vigne. (Ann. Inst. Ampél. R. Hongrois, iv.) Budapest. 1913. 8vo.

Janke, H. See **Schlechter, F. R. R.** 1914.

Janssonius, H. H. Mikrographie einiger technisch wichtigen Holzarten aus Surinam. (Verh. K. Akad. Wetensch. Amst. 2, xviii.) Amsterdam, 1914. 8vo.

Author.

Johnson, William Henry. Elementary Tropical Agriculture. London. 1913. 8vo.

Crosby, Lockwood & Son.

Johnston, J. A. See **Bennie, J., & J. A. J.** 1894.

Jordan, David Starr, & Vernon L. Kellogg. The scientific aspects of Luther Burbank's work. San Francisco, 1909. 8vo.

Jost, Ludwig. [Lectures on] Plant Physiology. Authorized English translation by R. J. Harvey Gibson. Supplement. Oxford. 1913. 8vo.

Keeble, Frederick. Biography of John Lindley. See **Oliver, F. W.** Makers of British Botany. 1913.

Kellog, Harriette S. See **Pammel, L. H., & others.** The Weed Flora of Iowa. 1913.

Kellogg, Vernon L. See **Jordan, D. S., & V. L. K.** 1909.

Kerr, A. F. G. Recent advances in our knowledge of the Flora of Siam. (Journ. Siam Soc. x.) Bangkok, 1913. 8vo.

Author.

Kew Royal Botanic Gardens. Official Guide to the North Gallery. Ed. 6. London, 1914. 8vo.

Kidston, Robert. Notes on Fossil Spores from the Coal Measures, Kellyburn, near Dollar, Perthshire. (Stirling Journ. & Advertiser.) [Stirling], 1885. 8vo.

Clement Reid.

King, Charlotte M. See **Pammel, L. H., & others.** The Weed Flora of Iowa. 1913.

Kluyver, A. J. Biochemische Suikerbepalingen. Proefschrift. Leiden, 1914. 8vo.

Author.

Koch, Wilhelm Daniel Joseph. Taschenbuch der deutschen und schweizer Flora, etc. Original-Ausgabe . . . gänzlich umgearbeitet von Ernst Hallier. Leipzig, 1878. 8vo.

Krause, Ernst H. L. Die Legende vom begrannten Sommerweizen. (Naturw. Wochenschr. N. F., x.) (Jena, 1911.) 4to.

Krause, E. H. L. Zweierlei Ruchgras? (Naturw. Wochenschr. N. F., x.) (Jena, 1911.) 4to.

Krause, E. H. L. Schwarzer Hafer und Flughafer. (Naturw. Wochenschr. N. F., x.) (Jena, 1911.) 4to.

Krause, E. H. L. Zur Vorgeschichte des Sommerkorns. (Naturw. Wochenschr. N. F., x.) (Jena, 1911.) 4to.

Krause, E. H. L. Zur Vorgeschichte von Kresse und Waid. (Naturw. Wochenschr. N. F., x.) (Jena, 1911.) 4to.

Lace, John Henry. List of Trees, Shrubs, and principal Climbers, &c., recorded from Burma, with vernacular names. [Rangoon?] (1913.) sm. 8vo.

Author.

Laemmermayr, Ludwig. Die grüne Pflanzenwelt der Höhlen. I. Teil. (Denkschr. Akad. Wien, lxxxvii.) Wien, 1911. 4to.

Lagerheim, Gustaf. Sobre la multiplicación agámica por conidios del protallo de ciertos Helechos. (An. Univ. Centr. Ecuad. v. n. 42.) Quito, 1891. 8vo.

Author.

Lagerheim, G. Ueber Dipterocecidien auf *Carex*-Arten. (Tromsö Mus. Aarshafter, xvi.) [Tromsö] (1894.) 8vo.

Author.

Lagerheim, G. Technische Mittheilungen. 1. Eine haltbare Stärketinction. 2. Erfahrungen über die Verwendbarkeit des Amann'schen Kupferlaktophenols. (Zeitschr. f. wiss. Mikrosk. xiv.) [Leipzig] (1897.) 8vo.

Lagerheim, G. Zur Frage der Schutzmittel der Pflanzen gegen Raupenfrass. (Entomol. Tidskr. xxi.) [Stockholm] (1900.) 8vo.

Author.

Lagerheim, G. Zoocecidien vom Feldberg (Mitt. Badisch. Bot. Ver. 1903.) [Karlsruhe], (1903.) 8vo.

Author.

Lagerheim, G. Nya eller mindre bekanta pyrdnadsväxter. (Trädgården, 1912.) (Stockholm, 1912.) 4to.

Author.

Lagerheim, G. Solförmörkelsens inverkan på ljuskänsliga växter. (Fauna och Flora, 1912.) (Uppsala, 1912.) 8vo.

Author.

Lagerheim, G. Das schwedische Hartbrot. (Internat. Arch. f. Öff. Mundhygiene, 1913.) [s.l.] (1913.) 8vo.

Author.

Lagerheim, G. Om "Ouvirandrano" och växternas nätblad. (Fauna och Flora, 1913.) [Uppsala] (1913.) 8vo.

Author.

Lagerheim, G. Linnés pelarkaktus. (Fauna och Flora, 1914.) [Uppsala] (1914.) 8vo.

Author.

Lagerheim, G., & G. Wagner. Bladfläcksjuka å potatis (*Cercospora concors*, Sacc.). (Landtb.-Akad. Handl. 1903.) Stockholm, 1903. 8vo.

G. Lagerheim.

Lang, William Henry. Biography of William Griffith. See **Oliver, F. W.** Makers of British Botany. 1913.

Larter, Clara Ethelinda. *Viola* in Devon: some account of the distribution. (Trans. Devon. Assoc. Adv. Sc. xlv.) [Plymouth] (1913.) 8vo.

Author.

Lázaro é Ibiza, Blas. Nuevos Tuberáceos de España. (Rev. R. Acad. Cienc. Madrid, 1908.) Madrid, 1908. 8vo.

Author.

Lázaro é Ibiza, B. Los "*Phragmidium*" de España. (Rev. R. Acad. Cienc. Madrid, 1911.) Madrid, 1911. 8vo.

Author.

Lázaro é Ibiza, B. Procedimientos de cultivo aplicables á las Algas. (Asoc. Españ. Progr. Cienc. 1911.) (Madrid, 1911.) 8vo.

Author.

Lázaro é Ibiza, B. Notas micológicas: colección de datos referentes á los Hongos de España. Tercera serie. (Mem. R. Soc. Españ. Hist. Nat. vii.) Madrid, 1912. 8vo.

Author.

Lenticchia, Attilio. See **Franzoni, A.** 1890.

Lindau, Gustav. See **Schlechter, F. R. R.** 1914.

Lindley, John. Biography by F. Keeble. See **Oliver, F. W.** Makers of British Botany. 1913.

Lisbon. Herbarii Gorgonei Universitatis Olisiponensis Catalogus. See **Coutinho, A. X. P.** 1914.

Lloyd, Curtis Gates. Synopsis of the Stipitate Stereums. Cincinnati. 1913. 8vo.

Author.

Lock, Robert Heath. Rubber and Rubber planting. Cambridge, 1913. 8vo.

Author.

McAlpine, Daniel. Handbook of fungus diseases of the Potato in Australia and their treatment. (Dep. Agric., Victoria.) Melbourne, 1911. 8vo.

Agent-General for Victoria.

McDermott, Laura Frances. An illustrated key to the North American species of *Trifolium*. San Francisco, 1910. 8vo.

MacDougal, Daniel Trembly. Annual Report of the Director of the Department of Botanical Research, Carnegie Institution of Washington. (From Year Book, n. 12, 1913.) [Washington, 1914.] 8vo.

Author.

Malmquist, A. See **Schlechter, F. R. R.** 1914.

Manchester. University of Manchester. The new Botanical Laboratories, &c. Manchester, (1911.) 8vo.

Clement Reid.

Marloth, Rudolf. The Flora of South Africa, with synoptical tables of the Genera of the Higher Plants. Vol. i. Cape Town and London, 1913. 4to.

Marloth, R. The Chemistry of South African Plants and Plant Products. (Presidential Address to Cape Chem. Soc., May, 1913.) Cape Town, 1913. 8vo.

Author.

Marshall, Humphry. Biography. See **Chester County Historical Society.** Bulletin. § 3.

Martin, J. N. See **Pammel, L. H., & others.** The Weed Flora of Iowa. 1913.

Massalongo, Caro. A proposito dei pronubi della "*Mandevilla suaveolens*" Lindl. (Atti R. Ist. Ven. Sc. lxxii.) Venezia, 1913. 8vo.

Author.

Massalongo, C. Le Lepidoziaceae della Flora Italica. (Atti R. Ist. Ven. Sc. lxxii.) Venezia, 1913. 8vo.

Author.

Massalongo, C. Le Ptilidiaceae della Flora Italica. (Atti R. Ist. Ven. Sc. lxxii.) Venezia, 1913. 8vo.

Author.

Massee, George Edward. Biography of Miles Joseph Berkeley. See **Oliver, F. W.** Makers of British Botany. 1913.

Massee, G. E., & Charles Crossland. The Fungus Flora of Yorkshire, &c. (Bot. Trans. Yorks. Nat. Union, iv.) London, 1905. 8vo. [Second copy, with MS. additions.]

C. Crossland.

Massee, G. E., & Ivy Massee. Mildews, Rusts and Smuts: a synopsis of the families Peronosporaceae, Erysiphaceae, Uredinaceae and Ustilaginaceae. London, 1913. 8vo.

Massee, Ivy. See **Massee, G. E., & I. M.** 1913.

Mendoza, Diego. Expedición botánica de José Celestino Mutis al Nuevo Reino de Granada y Memoiras inéditas de Francisco José de Caldas. Madrid, 1909. 8vo.

Merrill, Elmer Drew. A Flora of Manila. Manila, 1912. 8vo.

Molon, Girolamo. Le Yucche: nozioni botaniche-specie-varietà-ibridi-usi economici. Milano, 1914. sm. 8vo.

Morison, Robert. Account of the Morisonian Herbarium. See **Vines, S. H., & G. C. Druce.** 1914.

Morison, R. Biography by S. H. Vines. See **Oliver, F. W.** Makers of British Botany. 1913.

Moss, Charles Edward. The Cambridge British Flora, by C. E. M., assisted by specialists in certain genera. Illustrated from drawings by E. W. Huxybux. Vol. ii. (text and plates). Cambridge, 1914. fol.

Mueller, Franz. Das Geschlecht von *Orchis* im Lateinischen und in der Botanik. (Mitt. Gartenbau-Ges. Steiermark, 1913.) (Graz, 1913.) 8vo.

Author.

(

Murray, Sir James Augustus Henry. A new English Dictionary on historical principles . . . edited by J. A. H. M. (H. Bradley & W. A. Craigie.) Vol. i-viii. Oxford, (1884)—1914 —→ 4to.

Mutis, José Celestino. See **Mendoza, D.** 1909.

Nathorst, Alfred Gabriel. Om förekomsten af *Sphenothallus* cfr. *angustifolius* Hall i silurisk skiffer i Vestergötland. (Geol. Forën. Stockh. Förhandl. vi.) [Stockholm, 1883.] 8vo.

Clement Reid.

Nathorst, A. G. Ueber die oberdevonische Flora (die "Ursaflora") der Bären Insel. (Bull. Geol. Inst. Upsala, iv.) Uppsala, 1900. 8vo.

Clement Reid.

Nathorst, A. G. *Phyllotheca*-Reste aus den Falkland-Inseln. (Bull. Geol. Inst. Upsala, vii.) Uppsala, 1906. 8vo.

Clement Reid.

Nathorst, A. G. Contributions to the Carboniferous Flora of North-eastern Greenland. (Meddel. om Grönl. xliii.) Köbenhavn, 1911. 8vo.

Clement Reid.

Newman, Leslie Frank. See **Nicholson, W. A.** 1914.

New South Wales. Handbook. See **British Association for the Advancement of Science.** 1914. § 3.

Nicholson, Walter Alexander. A Flora of Norfolk, with papers on climate, soils, &c., by members of the Norfolk and Norwich Naturalists' Society, edited by W. A. N. (Climate, by A. W. Preston. Soils, by L. F. Newman. Physiography and Plant distribution, by W. H. Burrell.) London, 1914. 8vo.

Nigrisoli, Francisco Maria. Febris China Chinae expugnata, &c. Ed. 2. Ferrariae, 1700. sm. 4to.

Bentham Trustees.

Oliver, Francis Wall. Makers of British Botany. A collection of biographies by living Botanists, edited by F. W. O. Cambridge, 1913. 8vo.

Oliver, F. W. Biography of Arthur Henfrey. See **Oliver, F. W.** Makers of British Botany. 1913.

Oliver, F. W. See **Blakeney.** [1914.]

Osborn, T. G. B. Botany and Plant Pathology. (Brit. Assoc. Handb. S. Australia, 1914.) Adelaide, 1914. 8vo.

Author.

Oxford. Physic Garden, 1619-1720. See **Vines, S. H., & G. C. Druce.** 1914.

Pace, Lula. Two species of *Gyrostachys* [*G. gracilis* and *G. cernua*]. (Baylor Univ. Bull. xvii.) (Waco, Texas), 1914. 8vo.

Author.

Palībīn Īvan Vladīmirovīch. Dīkorastushchie khlyebnuie zlakī Mongholov.— Céréales spontanées des Mongoles. (Ann. Samenprüfungs-Anst. K. Bot. Gart. Peter des Grossen, ii.) S. Petersburgh, 1914. 8vo.

Author.

Pálinkás, Gy. See **Istvánffi de Csík Madéfalva, A. Gyula, & G. P.** 1913.

Pammel, Louis Herman, & others. The Weed Flora of Iowa. (Iowa Geol. Surv. Bull. 4.) Des Moines, 1913. 8vo.

Iowa Geological Survey.

Pau, Carlos. Nueva Planta de Siria, *Morettia Ubachi* n. sp. (Bol. Soc. Aragon. Ciene. Nat. 1913.) [Zaragoza] (1913.) 8vo.

Author.

Pau, C. Sobre algunos Vegetales curiosos. (Bol. Soc. Aragon. Ciene. Nat. 1914.) [Zaragoza] (1914.) 8vo.

Author.

Perla, Francesco. De orientali Opobalsamo nuper in Theriacae confectione adhibito, . . . historica & physica dissertatio. Romae, 1641. 12mo.

Bentham Trustees.

Petre, Robert James, 8th Lord. Biography. See **Britten, James.** 1914.

Pfeffer, Wilhelm Bryogeographische Studien aus den rhätischen Alpen. (Neue Denkschr. Schweiz. Naturf. Ges.) (Zürich, 1871.) 4to.

Pfeffer, W. The Physiology of Plants. A treatise upon the Metabolism and sources of energy in Plants. Ed. 2, translated and edited by Alfred J. Ewart. Oxford, 1900-06. 3 vols. 8vo.

Pharmacopœia. The British Pharmacopœia, 1914. London, 1914. 8vo.

General Medical Council.

Pilger, Robert. Corallinaceae aus dem westlichen Indischen Ozean. (Voeltzkow, Reise in Ostafrika, 1903-05. Wiss. Ergebn. iii.) Stuttgart, 1908. 4to.

A. D. Cotton.

Pilger, R. See **Francé, R. H.** 1913.

Piper, Charles Vancouver. The name of the Soy Bean: a chapter in its botanical history. (Journ. Amer. Soc. Agron. vi.) [Washington, D.C. ?] (1914.) 8vo.

Author.

Pittier, Henri. On the relationship of the genus *Aulacocarpus*, with description of a new Panamanian species [*A. completens*]. (Smithson. Misc. Coll. lxiii.) Washington, 1914. 8vo.

Secretary, Smithsonian Institution.

Pliny. C. Plinii Secundi Veronensis Historiae naturalis libri xxxvii. ab Alexandro Benedicto Ve. physico emendatiores redditi. (Venetiis, 1507.) fol.

Bentham Trustees.

Pona, Francesco. Tratto de' Veleni, e lor cura. Verona, 1643. sm. 4to.

Bentham Trustees.

Popenoe, Paul B. Date growing in the Old World and the New. With a chapter on the food value of the Date, by Charles L. Bennett. Altadena, Cal., 1913. 8vo.

Author.

Popenoe, P. B. A Scientist in Horticulture. Work of the botanist, L. Trabut, for the colonists of Algeria. (Univ. Calif. Journ. Agric. i.) (Berkeley, 1914.) 8vo.

K. A. Ryerson.

Potonié, Henry. Ueber die den Wasserspalten physiologisch entsprechenden Organe bei fossilen und recenten Farnarten. (Sitzb. Ges. Naturf. Freunde, Berlin, 1892.) (Berlin, 1892.) 8vo.

Clement Reid.

Potonié, H. Erwiderung auf Prof. Westermaier's Besprechung meiner Rede über "Die von den fossilen Pflanzen gebotenen Daten für die Annahme einer allmählichen Entwickelung von Einfacheren zum Verwickelteren." (N. Jahrb. f. Mineral. Geol. &c., ii.) Stuttgart, 1902. 8vo.

Clement Reid.

Potonié, H. Eine rezente organogene Schlamm-Bildung des Cannelkohlen-Typus. (Jahrb. K. Preuss. Geol. Landesanst. xxiv.) Berlin, 1904. 8vo.

Clement Reid.

Potonié, H. Kaustobiolithe. (Geol. Rundschau. i.) Leipzig, 1910. 8vo.

Clement Reid.

Potonié, H. Eine im Ögelsee (Prov. Brandenberg) plötzlich neu entstandene Insel. (Jahrb. K. Preuss. Geol. Landesanst. xxxii.) Berlin, 1911. 8vo.

Clement Reid.

Praeger, Robert Lloyd. Biography of William Henry Harvey. See **Oliver, F. W.** Makers of British Botany. 1913.

Preston, A. W. See **Nicholson, W. A.** 1914.

Prevost, E. W., & others. The Peat and Forest Bed at Westbury-on-Severn. [Plantae by Clement Reid.] (Proc. Cotteswold Nat. Field Club, xiv.) (Gloucester, 1901.) 8vo.

Clement Reid.

Radlkofer, Ludwig. New Sapindaceae from Panama and Costa Rica. (Smithson. Misc. Coll. lxi.) Washington, 1914. 8vo.

Secretary, Smithsonian Institution.

Raffles, Lady Sophia. Memoir of the life and public services of Sir Thomas Stamford Raffles . . . with details of the commerce and resources of the Eastern Archipelago, &c., by his widow. New ed. London, 1835. 2 vols. 8vo.

Raffles, Sir Thomas Stamford. See **Raffles, Lady Sophia.** 1835.

Rakete, Rudolf. Bryologische und lichenologische Beobachtungen im Süden der Görlitzer Heide. See **Goerlitz.** Naturf. Ges. Abh. xxvii. § 3.

Raunkiær, Christen. Sur la Végétation des Alluvions méditerranéennes françaises. (Mindeskrift for J. Steenstrup; Arb. Bot. Have Köbenh. n. 75.) Köbenhavn, 1914. 8vo.

Bot. Libr., Univ. of Copenhagen.

Ray, John. Biography by S. H. Vines. See **Oliver, F. W.** Makers of British Botany. 1913.

Reid, Clement. See **Prevost, E. W., & others.** 1901.

Reinbold, Theodor. Die Meeresalgen der deutschen Südpolar-Exped., 1901-03. See **Drygalski, E. von.** 1906-11.

Rich, Florence. See **Fritsch, F. E.** 1913.

Rikli, Martin Albert. Die Arve in der Schweiz. Ein Beitrag zur Waldgeschichte und Waldwirtschaft der Schweizer Alpen. Teil 1: Text. Teil 2: Tafeln und Karten. (N. Denkschr. Schweiz. Naturf. Ges. xliv.) Basel, Genf & Lyon, 1909. 4to.

Rodway, Leonard. Tasmanian Bryophyta. Vol. i. Mosses. Hobart, 1914. 8vo.

Royal Society of Tasmania.

Rost, E. Zur Kenntnis der hautreizenden Wirkungen der Becherprimel (*Primula obconica*, Hance.) (Arbeit. Kaiserl. Gesundheitsamte, xlvii.) Berlin, 1914. 1a. 8vo.

Clement Reid.

Rothamsted. The Rothamsted Memoirs on Agricultural Science. Vol. viii. 1902-12. Harpenden, 1914. 8vo. [For previous volumes see **Lawes, Sir J. B., & Sir J. H. Gilbert.**]

Secretary, Board of Agriculture & Fisheries.

Ruiz Lopez, Hipólito. Della China e delle altre sue specie nuovamente scoperte e descritte da D. Ippolito Ruiz . . . Prima traduzione. Roma, 1792. 8vo.

Bentham Trustees.

[**Russells & Willmott.**] A catalogue of Trees, Shrubs, Plants. Flower Roots, Seeds, &c. [offered by Russells & Willmott, Nursery- and Seedsmen. Lewisham, Kent. London 1798?]. 8vo.

Ryerson, K. A. New varieties of the Avocado for California. (Univ. Calif. Journ. Agric. i.) (Berkeley, 1913.) 8vo.

Author.

St. Petersburg. Museum Botanicum Academiae Imperialis. Flora Sībīrī ī Dal'nyagho Bostoka . . . Flora Sibiriae et Orientis extremi a Museo Botanico Academiae Imperialis Scientiarum Petropolitanae edita. Vuipusk 1. S. Peterburgh, 1913. 8vo.

Administration of the Museum.

Santa Cruz (St. Croix). Agricultural Experimental Station of St. Croix. Report, 1912-13, by Longfield Smith. Copenhagen, 1914. 8vo.

Author

[**Saulière, A.**] Plants from the Pulney Hills [Madras Presidency]. 1. Phanerogams. (Trichy), [1914 ?]. 8vo.

Sauvageau, Camille. Remarques sur les Sphacélariacées. Bordeaux, 1900-14. 8vo. (Partly a reprint from Journ. de Bot. xiv-xviii.)

Author.

Schenck, Heinrich. Die Gefässpflanzen der deutschen Südpolar-Exped., 1901-03. See **Drygalski, E. von.** 1906-11.

Schenk, August. Ueber *Sigillariostrobus.* (Ber. K. Sächs. Ges. Wiss. 1885.) [Leipzig], (1885.) 8vo.

Clement Reid.

Schenk, A. Ueber *Medullosa* Cotta and *Tubicaulis* Cotta. (Abh. K. Sächs. Ges. Wiss. xv.) Leipzig, 1889. 8vo.

Clement Reid.

Schiffner, Victor. Die Lebermoose der deutschen Südpolar-Exped., 1901-03. See **Drygalski, E. von.** 1906-11.

Schlechter, Friedrich Richard Rudolf. Orchidacées de Madagascar. Orchidac[e]ae Perrierianae Madagascarienses. (Ann. Mus. Col. Marseille, 3, i.) Marseille & Paris, 1913. 8vo.

Sir Frank Crisp.

Schlechter, F. R. R. Die Orchideen: ihre Beschreibung, Kultur und Züchtung. Handbuch . . . herausg. von R. S. unter Mitwirkung von O. Beyrodt, H. Janke, G. Lindau und A. Malmquist. Lfg. 1–3. Berlin, 1914 —— 8vo.

Schrank, Franz von Paula von. Sammlung von Zierpflanzen . . . nach der Natur gemahlt . . . von Joseph Presiele. München, 1819. fol.

Schube, Theodor. Naturdenkmäler aus der Baumwelt der preussischen Oberlausitz. See **Goerlitz.** Naturf. Ges. Abh. xxvii. § 3.

Schuster, Julius. Ueber die Fruktifikationen von *Schuetzia anomala.* (Sitzb. Akad. Wien, cxx.) Wien, 1911. 8vo.

Scott, Dukinfield Henry. Biography of William Crawford Williamson. See **Oliver, F. W.** Makers of British Botany. 1913.

Seward, Albert Charles. New genus [*Stormbergia*] of Fossil Plants from the Stormberg series of Cape Colony. (Geol. Mag. N. S., viii.) London, 1911. 8vo.

Clement Reid.

Seward, A. C. Wealden Floras. (Hastings & E. Sussex Nat. ii.) [Hastings] (1914.) 8vo.

Author.

Seward, A. C. Antarctic Fossil Plants. (Brit. Antarctic Exped. 1910. Geol. i.) London, 1914. 4to.

Author.

Shaw, George Russell. The Genus *Pinus*. (Publications of the Arnold Arboretum, n. 5.) Cambridge, Mass., 1914. 4to.

Director, Arnold Arboretum.

Shaw, Norman. Manchurian Tussore Silk. London, [1914?] 8vo.

Author.

Skinner, J. J. Effect of salicylic aldehyde on Plants in soil and solution cultures. (Biochem. Journ. iii.) [New York, 1914.] 8vo.

Smith, Erwin Frick. Bacteria in relation to Plant Diseases. Vol. iii. (Carnegie Inst. Washington, Publ. 27.) Washington, D.C., 1914. 4to.

Smith, Harold Hamel, & F. A. G. Pape. Coco-nuts: the Consols of the East, &c. Ed. 2. With forewords to both editions by Sir W. H. Lever, Bt. London, (1914.) 8vo.

John Bale Sons & Danielsson, Ltd.

Smith, Longfield. See **Santa Cruz.** Agric. Exper. Station. Report, 1912-13.

Stebbing, Edward Percy. Indian Forest Insects of economic importance. Coleoptera. London, 1914. 8vo.

Secretary of State for India.

Stella, Benedetto. Il Tabacco, opera . . . nella quale si tratta dell' origine, historia, coltura . . . della Pianta volgaramente detta Tabacco, &c. Roma, 1669. sm. 8vo.

Bentham Trustees.

Stevens, Frank Lincoln. The Fungi which cause Plant Disease. New York, 1913. 8vo.

Stevens, George H., & J. Warren Armitage. Index to "Patents, Technology and Bibliography of China Wood Oil (Tung Oil)." Irvington & Newark, N.J., 1914. 4to.

Authors.

Stirton, James. On some Mosses from the Western Highlands, &c. (Glasgow Nat. vi.) (Glasgow, 1914.) 8vo.

Author.

Stone, Herbert, & William George Freeman. Timbers of British Guiana. A report upon the collection made by the Hon. A. G. Bell. London, 1914. 8vo.

Government of British Guiana.

Stopes, Marie Carmichael Charlotte. The "Fern Ledges" carboniferous Flora of St. John, New Brunswick. (Canada Geol. Surv. Mem. 41.) Ottawa, 1914. 8vo.

Director, Geol. Surv., Canada.

Strecker, W. Erkennen und Bestimmen der Wiesengräser im Blüten- und blütenlosen Zustande, &c. Ed. 6. Berlin, 1913. 8vo.

Stuckert, Teodoro. Tercera contribución al conocimiento de las Graminácceas Argentinas. (An. Mus. Nac. Buenos Aires, xxi.) Buenos Aires, 1911. la. 8vo.

Author.

Sudre, Henri. Excursions batologiques dans les Pyrénées, ou description et analyse des *Rubus* des Pyrénées françaises. Le Mans, 1898-1903. 8vo.

Sudre, H. *Rubi* Europae, vel Monographia iconibus illustrata *Ruborum* Europae. Paris, 1908-13. 4to.

Sudre, H. Bréviaire du Batologue, ou analyse descriptive des Ronces d'Europe. (Extrait des *Rubi* Europae, Monogr. ic. ill. . . . du même auteur.) Paris, 1913. sm. 8vo.

Sydney. Botanic Gardens. Plan of the Botanic Gardens, Sydney. Sydney, 1914.

J. H. Maiden.

Sydow, H., & Sydow, Paul. Contribution à l'étude des Champignons parasites de Colombie. (Fuhrmann & Mayor, Voy. . . . en Colombie; Mem. Soc. Neuchâtel. Sc. Nat. v.) Neuchatel, 1913. 4to.

Authors.

Tansley, Arthur George. See Thompson, H. S. 1914.

Thompson, Harold Stuart. Sub-alpine Plants, or Flowers of the Swiss woods and meadows. London, 1912. 8vo.

Author.

Thompson, H. S. Flowering Plants of the Riviera. . . . With an introduction . . . by A. G. Tansley. London, 1914. 8vo.

Author.

Tottingham, William E. A quantitative chemical and physiological study of nutrient solutions for Plant Cultures. (Physiol. Res. i.) Baltimore, Md., 1914. 8vo.

Author.

Trabut, Louis. Le Kumquat, *Citrus japonica*. Culture dans le Nord de l'Afrique. (Gouv. Gén. de l'Algérie. Agric. Service botanique. Bull. 51.) Alger, 1914. 8vo.

Author.

Trabut, L. See **Popenoe, P.** (1914.)

Trimmer, Kirby. Supplement to the Flora of Norfolk. London, [1885.] 8vo.

Tucker, Ethelyn Maria. See **Arnold Arboretum,** &c. Catalogue of the Library.

Turner, Frederick. The suspected poison Plants of New South Wales and the introduced poisonous Weeds and Grasses. (P. F. A. Quart. Mag. i.) (Sydney, 1914.) 4to.

Author.

Uganda. Handbook of Uganda. See **Wallis, H. R.** 1913.

United States. Department of Agriculture. Bureau of Plant Industry. How to send living Plant material to America, by David Fairchild. [Washington, s.a.] 4to.

United States. Department of Commerce and Labor. Bureau of Fisheries. Bulletin. Vol. xxxi. Washington, 1913. 2 vols. (parts). 8vo. [*Contains*: A biological survey of the waters of Woods Hole and vicinity. Botany by Bradley M. Davis.]

A. D. Cotton.

Vavilov (or **Wawilow**), **N.** 1. Materialui k voprosu ob ustoĭchivostí khyebnuikh zlakov protīv parazītīcheskīkh ghrībov.—Beiträge zur Frage über die verschiedene Widerstandsfähigkeit der Getreide gegen parasitische Pilze. 2. Ocherk sovremennagho sostoyaniya ucheniya ob immunitetye khlyebnuikh zlakow k ghrībnuim zabolyevaniyam.—Der gegenwärtige Stand der Frage nach der Immunität der Getreide gegen Pilzkrankheiten. (Arb. Versuchsst. Mosk. Landw. Inst. i.) Moskva, 1913. 8vo.

Author.

Victoria. Education Department. Circular of Information, no. 17. Forestry. (Melbourne, 1913.) 4to.

A. J. Ewart.

Vines, Sydney Howard. Biographies of Robert Morison and John Ray. See **Oliver, F. W.** Makers of British Botany. 1913.

Vines, S. H., & George Claridge Druce. An account of the Morisonian Herbarium in the possession of the University of Oxford. together with biographical sketches of Morison and the two Bobarts . . . and the early history of the Physic Garden, 1619-1720. Oxford, 1914. 8vo.

Delegates of the Clarendon Press.

Vivenzi, *latinized* **Viventius, Giovanni.** De *Cicuta* commentarius. Ed. 3 . . . accedit epistola de Neapolitana epidemica febre anni mdccLxiv. Neapoli, 1774. sm. 4to.

Bentham Trustees.

Vollmann, Franz. Flora von Bayern. Stuttgart, 1914. 8vo.

Vuillet, Jean. Note sur l'"*Hyptis spicigera*" ou "Bénéfing." oléagineux indigène peu connu. (Bamako, 1911.) 8vo.

Author.

Wagner, G. See **Lagerheim, G., & G. W.** 1903.

Walcott, Charles D. Cambrian Geology and Paleontology. III. No. 2. Pre-Cambrian Algonkian Algal Flora. (Smithsonian Misc. Coll. lxiv.) Washington, 1914. 8vo.

Secretary, Smithsonian Institution.

Wallis, Henry Richard. The Handbook of Uganda. London, 1913. 8vo.

Crown Agents for the Colonies.

Ward, Harry Marshall. Biography by Sir William Thiselton-Dyer. See **Oliver, F. W.** Makers of British Botany. 1913.

Wawilow, N. See **Vavilov, N.**

Weiss Frederick Ernest. The Parichnos in the Lepidodendraceae. (Mem. & Proc. Manch. Lit. & Phil. Soc. li.) Manchester, 1907. 8vo.

Clement Reid.

Wernham, Herbert Fuller. A monograph of the genus *Sabicea*. (British Museum. Natural History.) London, 1914. 8vo.

Trustees, British Museum.

Werth, Emil. Die Vegetation der subantarktischen Inseln, &c. See **Drygalski, E. von.** 1906-11.

Whetzel, Herbert Hice. Spraying orchards for the control of apple scab. (Mass. Fruit Growers' Assoc. 19th Ann. Rep.) [Boston ?] (1913.) 8vo.

Dep. Plant Pathol., Cornell Univ.

Williamson, William Crawford. Biography by D. H. Scott. See **Oliver, F. W.** Makers of British Botany. 1913.

Willkomm, Heinrich Moritz. See **Groenland, J.**

Willmott, Ellen Ann. The Genus *Rosa*. Drawings by Alfred Parsons. London, 1910-14. 2 vols. 4to.

Author.

Willmott, Jr., John. An alphabetical enumeration of the Plants contained in the Hortus Kewensis, with additions from Dr. Coyte's Botanic Garden and the Hortus Cantabrigiensis. London, (1798.) 8vo.

Willmott. See **Russells & Willmott.** 1798 ?

Winkler, Hubert. See **Francé, R. H.** 1913.

Witt, David Otto. List of Trees, Shrubs and Climbers, &c., found in the Berar Forest Circle of the Central Provinces. Nagpur, 1908. 8vo.—List of Fodder Grasses found in the Berar Forest Circle, &c. Allahabad, 1911. 8vo.—Illustrations of Grasses. [s. l. e. a] sm. fol. The preceding are lettered on the cover: "Forest Flora of the Berar Circle."

Secretary of State for India.

Yendo, Kichisaburo. Kaisan Shokubutsu Gaku. [i.e., Marine Botany.] Tokyo, 1911. 8vo.

Zacher, Friedrich. Die wichtigsten Krankheiten und Schädlinge der tropischen Kulturpflanzen und ihre Bekämpfung. Bd. i. Hamburg, 1914. 8vo.

Zahlbruckner, Alexander. Die Flechten der deutschen Südpolar-Exped., 1901-03. See **Drygalski, E. von.** 1906-11.

---

§ 2.—TRAVELS.

Brooke, John Weston. See **Fergusson, W. N.** 1911.

Drake-Brockman, Ralph Evelyn. British Somaliland. London, 1912. 8vo.

Fergusson, W. N. Adventure sport and travel on the Tibetan Steppes. [Mainly an account of two journeys in China and Tibet by Lieut. J. W. Brooke.] London, 1911. 8vo.

Gadow, Hans. Through Southern Mexico: being an account of the travels of a Naturalist. London, 1908. 8vo.

Hosie, Alexander. Manchuria: its people, resources and recent history. London, 1901. 8vo.

Mecklenburg, Adolf Friedrich, Herzog zu. In the Heart of Africa. Translated by G. E. Maberly-Oppler. London, 1910. 8vo.

Olufsen, O. The Emir of Bokhara and his country. Journeys and studies in Bokhara (with a chapter on my voyage to the Amu Darya to Khiva.) Copenhagen and London, 1911. 8vo.

Raffles, Sir Thomas Stamford. The History of Java. Ed. 2. London, 1830. 2 vols. 8vo.

Raffles, Sir T. S. Antiquarian, architectural, and landscape illustrations of the History of Java, by the late Sir T. S. Raffles. London, 1844. 4to.

Skottsberg, Carl. The Wilds of Patagonia. A narrative of the Swedish Expedition to Patagonia, Tierra del Fuego and the Falkland Islands in 1907-1909. London, 1911. 8vo.

---

§ 3.—PERIODICALS.

Including the Publications of Societies.

Africa. South Africa. Union of South Africa. Department of Agriculture. Division of Botany. Science Bulletin, nos. 3–4. Pretoria, 1914. 8vo.

P. A. van der Byl.

American Journal of Botany. Official publication of the Botanical Society of America. Vol. i. Lancaster, Pa., 1914 —→ 8vo.

American Journal of Pharmacy. Edited by John M. Maisch (H. Trimble & H. Kraemer). Vol. lvi–lxxxvi. (Vol. lvi–lxvii = ser. 4, vol. xiv–xxv.) Philadelphia, 1884–1914 —→ 8vo.

Annals of Applied Biology. Vol. i. no. 1. Cambridge, 1914. 8vo.

Annals of the Bolus Herbarium. Edited by H. H. W. Pearson. Vol. i. pt. 1–2. London, 1914 —→ 8vo.

Trustees of the Bolus Herbarium.

Annals of the Missouri Botanical Garden. See **St. Louis.**

British Association for the Advancement of Science. Eighty-fourth meeting . . . held in Australia, 1914. The Commonwealth of Australia. Federal handbook . . . edited by G. H. Knibbs. Melbourne, (1914). 8vo.

High Commissioner for Australia.

——— ——— Handbook for New South Wales. Sydney, 1914. 8vo.

New South Wales Committee, B.A.A.S.

Buitenzorg. Departement van Landbouw, Nijverheid en Handel. De Nuttige Planten van Nederlandsch-Indië . . . door K. Heyne. Eerste stuk. Batavia, 1913 —— 8vo.

Director.

———. ——— Verslag van eene reis naar Sumatra's O.-K. en de Padangsche Bovenlanden. Ter bestudeering van de theecultuur, door Ch. Bernard. [Buitenzorg, 1914.] la. 8vo.

Director.

Canada. Department of the Interior. Forestry Branch. Bulletins, 2, 3, 17, 28, 43, 44 Ottawa, 1911-1914 —→ 8vo.

———. ———. ———. Reports of the Superintendent (Director) of Forestry, 1904–13. (Ann. Rep. Dep. Interior, Canada, 1904–13.) Ottawa, 1905–14 —→ 8vo.

Canada. Geological Survey. Museum. Bulletin, nos. 1–2. Ottawa, 1913–14 —— 8vo. [The first number was issued as Victoria Memorial Museum Bulletin.]

Director, Geological Survey, Canada.

Chester County Historical Society. Bulletin. Exercises in memory of Humphry Marshall and William Darlington, at Marshallton, Pa., September 27, 1913. [West Chester, Pa., 1913.] 8vo.

C. S. Sargent.

Cirencester. Royal Agricultural College. Annual Scientific Bulletin, nos. 4 & 5 for 1912-13. Cirencester, 1914. 8vo.

Principal.

Formosa. Bureau of Productive Industry, Government of Formosa. Bulletins.—No. 46. The Report of the Horticultural Experiment Station, Formosan Government. Taihoku, 1914. 8vo.—No. 47. The Italian Lemon Industry and Formosa. Ib., 1914.—No. 48. The Banana Industry of the World. Ib., 1914. 8vo. (All in Japanese.)

Director, Horticultural Exper. Stat., Formosa.

Goerlitz. Naturforschende Gesellschaft. Abhandlungen. Bd. xxii-xxiii. & xxvii. Goerlitz 1898-[1911]. 8vo. [*Contains*: Ueber die Erosion der Pflanzen in den Kalkgebirgen, von Max Eckert (Bd. xxii. 209-224); Flora der Oberlausitz . . . , von E. Barber, Teil 1–3 (Bd. xxii. 337-387; Bd. xxiii. 1-169; Bd. xxvii. 239-412); *Rubus iseranus*, Barber, n. sp., von E. Barber (Bd. xxiii. 214-216); Naturdenkmäler aus der Baumwelt der preussischen Oberlausitz, von Theodor Schube (Bd. xxvii. 89-116); Bryologische und lichenologische Beobachtungen im Süden der Görlitzer Heide. von Rudolf Rakete (Bd. xxvii. 413-487)].

Iowa. Geological Survey. Bulletin, no. 4. The Weed Flora of Iowa. See **Pammel, L. H., & others.** 1913. § 1.

Jahrbuch für Staudenkunde, herausg. von der Deutscher Dendrologischer Gesellschaft. Nr. 1, 1913. Wendisch-Wilmersdorf, [1914?] 8vo.

Journal of Heredity (*formerly* The American Breeders' Magazine). Organ of the American Genetic Association. Vol. v. Washington, D.C., 1914 —→ 8vo.

London. Imperial Bureau of Entomology (*formerly* Entomological Research Committee appointed by the Colonial Office). Review of Applied Entomology.—Series A. Agricultural. Vol. i. London, (1913-14) —→ 8vo.—Series B. Medical and Veterinary. Vol. i. London, (1913-14) —→ 8vo.

London. Royal Society of London. Catalogue of Scientific Papers. Fourth Series (1884-1900). Vol. xiii. Cambridge, 1914. 4to.

Madras. Presidency College. Botanical Bulletin. Series A, nos. 1-24, edited by P. F. Fyson. Madras Flowers. Madras, 1912-14 —→ 8vo.

Secretary of State for India.

Report of the **South African Association** for the Advancement of Science. See **South African Association, &c.**

Review of Applied Entomology. See **London.** Imperial Bureau of Entomology.

Rome. Institut International d'Agriculture. Rapport de la 2me division à la 2me commission permanente, Novembre 1909. Pt. 4. Vol. iii. Rome, 1909. 4to.—Extrait du Rapport . . . Annexe IV. Ib., 1909. 4to.

——. ——. Assemblée générale, 2me session, Décembre 1909. Procès-verbaux. Rome, 1909. 4to.

Rome. Institut International d'Agriculture. Assemblée générale, 3me session, 1911. Rapports et études du Bureau des Renseignements agricoles et des Maladies des Plantes, etc. iv. Rome, 1911. 4to.

——. ——. Le Service de Protection des Plantes dans les divers pays. Ed. 2. Rome, 1914. 4to.

St. Louis. Missouri Botanical Garden. Annals. Vol. i. nos. 1-3. Concord, N. H., 1914 —— 8vo.

Director.

South African Association for the Advancement of Science. Reports, 1903-07, 1909-12 (1st–5th & 7th–9th meetings). [=Vol. i–iv. vi.–ix. Vol. vi. (incomplete) is in parts the wrappers of which bear the title: The South African Journal of Science, &c.] Cape Town, [1904]–13. 8vo.

South African Journal of Science. See **South African Association** for the Advancement of Science. Reports.

§ 4.—MANUSCRIPTS.

Brown, Robert. 2 letters to William Withering, Edinburgh, January 29, 1797, and London, June 15, 1798. 3ff. 4to.

Church, Sir Arthur Herbert. [A list of titles of his notes and papers on Plant-Chemistry and Physiology, on certain Food-Grains, &c., and on Agricultural Chemistry, with subject-index.] 8ff. 8vo.

Hemsley, William Botting. A list of Plants contained in No. 15, "Museum Stove," [Royal Botanic Gardens, Kew] in the autumn of 1862. 4to. (Original list, with transcript).

Hooker, Sir William Jackson. Extracts from letters from Sir W. J. Hooker to Dawson Turner, relating to the Royal Botanic Gardens, Kew, 1834-50. 4to.

Kew. Royal Botanic Gardens. List of Stove and Greenhouse Plants, 1848. See **Smith, Alexander.**

——. ——. A list of Plants contained in No. 15, "Museum Stove," in 1862. See **Hemsley, W. Botting.**

——. ——. See **Hooker, Sir W. J.**

Pillans, N. S. Letters to N. E. Brown and to the Director, Royal Botanic Gardens, Kew, 1902-08. 1 vol. 4to.

Purdom, William. Notes on Seeds collected by W. Purdom whilst travelling for James Veitch & Sons, Ltd., in China, 1909-12. 4to.

J. Veitch & Sons, Ltd.

Smith, Alexander. List of Stove and Greenhouse Plants in the Royal Botanic Gardens, Kew, prepared in 1848. sm. 4to.

J. R. Jackson.

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX III.—1915.

NEW GARDEN PLANTS OF THE YEAR 1914.

The number of garden plants annually described in botanical and horticultural publications, both English and foreign, is now so considerable that it has been thought desirable to publish a complete list of them in the *Kew Bulletin* each year. The following list comprises all the new introductions recorded during 1914. These lists are indispensable to the maintenance of a correct nomenclature, especially in the smaller botanical establishments in correspondence with Kew, which are, as a rule, only scantily provided with horticultural periodicals. Such a list will also afford information respecting new plants under cultivation at this establishment, many of which will be distributed from it in the regular course of exchange with other botanic gardens.

The present list includes not only plants brought into cultivation for the first time during 1914, but the most noteworthy of those which have been re-introduced after being lost from cultivation. Other plants included in the list may have been in gardens for several years, but either were not described or their names had not been authenticated until recently.

In addition to species and well-marked varieties, hybrids, whether introduced or of garden origin, have been included where they have been described with formal botanical names. Mere cultural forms of well-known garden plants are omitted, for obvious reasons.

In every case the plant is cited under its published name, although some of the names are doubtfully correct. Where, however, a correction has appeared desirable, this is made.

The name of the person in whose collection the plant was first noticed or described is given where known.

An asterisk is prefixed to all those plants of which examples are in cultivation at Kew.

The publications from which this list is compiled, with the abbreviations used to indicate them, are as follows :—*Bean, T. & S.*—W. J. Bean, Trees and Shrubs hardy in the British Isles. *B.M.*—

(4034.) Wt. 225—595. 1,125. 8/15. J. T. & S. G. 14.

Botanical Magazine. *B. M. H. N.*—Bulletin du Muséum d'Histoire Naturelle, Paris. *B. S. D. F.*—Bulletin de la Société Dendrologique de France. *B. T. O.*—Bullettino della R. Società Toscana di Orticultura. *Gard.*—The Garden. *G. C.*—Gardeners' Chronicle. *Gfl.*—Gartenflora. *G. M.*—Gardeners' Magazine. *Haage & Schmidt, Cat.*—Haage & Schmidt, Haupt-Verzeichniss über Samen und Pflanzen. *Jard.*—Le Jardin. *J. of H.*—Journal of Horticulture. *J. H. F.*—Journal de la Société Nationale d'Horticulture de France. *J. R. H. S.*—Journal of the Royal Horticultural Society. *K. B.*—Bulletin of Miscellaneous Information, Royal Botanic Gardens, Kew. *Lemoine, Cat.*—Lemoine, Catalogue. *M. G. Z.*—Möllers Deutsche Gärtner-Zeitung. *M. K.*—Monatsschrift für Kakteenkunde. *N. B. G. Edinb.*—Notes from the Royal Botanic Garden, Edinburgh. *O. R.*—Orchid Review. *Orchis.*—Orchis. Beilage zur Gartenflora. *O. W.*—The Orchid World. *Pl. Wils.*—Plantae Wilsonianae, edited by C. S. Sargent. *R. H.*— Revue Horticole. *R. H. B.*—Revue de l'Horticulture Belge. *T. H.*—La Tribune Horticole.

The abbreviations in the descriptions of the plants are :—*diam.*—Diameter. *ft.*—Foot or Feet. *G.*—Greenhouse. *H.*—Hardy. *H.H.*—Half-hardy. *in.*—Inches. *S.*—Stove.

***Abelia Engleriana.** (*Bean, T. & S.* i. 114.) Caprifoliaceae. H. A deciduous shrub 2–4 ft. high. Leaves oval-lanceolate, ¾-1½ in. long, ⅓–⅝ in. broad, bristly hairy on the margin; petiole ⅛ in. long or less. Flowers usually in pairs at the end of short lateral branches. Corolla funnel-shaped, ⅝ in. long, rose-coloured. Central China. (Arnold Arboretum.)

***Abelia grandiflora.** (*Bean, T. & S.* i. 115.) H. Hybrid between *A. chinensis* and *A. uniflora*. Syn. *A. chinensis*, Hort., not of R. Brown. (Kew.)

Acanthopanax setchuenense. (*Bean, T. & S.* i. 132.) Araliaceae. H. Distinct in being glabrous in every part and in having trifoliolate leaves. It is a deciduous shrub or small tree. Leaflets oblong to ovate, 2-5½ in. long, 1–2 in. broad. Flowers in a panicle 5–7 in. long, consisting of about 6 spherical umbels 1–1½ in. across. Fruits black. Western China. (J. Veitch & Sons.)

***Acer rotundilobum.** (*Bean, T. & S.* i. 157.) Sapindaceae. H. Probably a hybrid between *A. monspessulanum* and *A. Opalus*, var. *obtusatum*. It has been cultivated in Europe for more than half a century.

***Acer Saccharum,** var. **Rugelii.** (*Bean, T. & S.* i. 158.) H. Leaves thin, 3-lobed, rather glaucous and downy beneath; lobes usually entire, triangular, pointed. South-Eastern United States. (Kew.)

Adenophora Watsoni. (*N. B. G. Edinb.* viii. 175.) Campanulaceae. H. A new species easily distinguished from its allies by its broadly obovate truncate leaves. Plant erect, robust, up to 2 ft. high. Leaves almost sessile, 1¼-1¾ in. long. Corolla funnel-shaped, ⅔–¾ in. long, blue. Western China. (Edinburgh B. G.)

Adiantum gloriosum Lemkesii. (*G. C.* 1914, lv. 364; *G. M.* 1914, 434.) Filices. S. An elegant fern, said to have been derived from *A. scutum roseum*. It closely resembles *A. farleyense gloriosum*. The young pale green fronds are suffused with salmon-rose. (Lemkes & Sons, Alphen, Holland.)

***Aerides Houlletianum Sanderae.** (*G. C.* 1914, lvi. 15.) Orchidaceae. S. Practically an albino form. Flowers creamy-white, with a yellow tint on the sepals and petals. (F. Sander and Sons.)

***Aesculus austrina.** (*Bean, T. & S.* i. 166.) Sapindaceae. H. This has probably been a long time in cultivation under the name of *A. Pavia*. It resembles this species, but is very distinct in the white down covering the leaves beneath and in the usually shorter calyx. South-eastern United States.

***Aesculus chinensis.** (*Pl. Wils.* i. 499; *K. B.* 1914, 50.) A large tree of rounded form, 80–90 ft. high. Leaves 5–7-foliate; leaflets nar-

rowly obovate to narrowly oval, up to 7½ in. long and 2½ in. broad. Panicles up to 14 in. long and 3½ in. broad at the base. Flowers white, ½–¾ in. broad. The plant usually met with in cultivation as *A. chinensis* is *A. turbinata*. North China. (Arnold Arboretum.)

***Aesculus Wilsonii.** (*Pl. Wils.* i. 498; *Bean, T. & S.* i. 169; *K. B.* 1914, 50.) H. Very closely allied to *A. chinensis* from which it may be distinguished by the following characters: Leaflets with longer petioles, usually not so tapering at the base, but rounded or slightly cordate, more downy at first, and with more numerous pairs of veins. Fruit ovoid or pear-shaped, bearing an apical mucro, seed larger. The panicle is sometimes 16 in. long and 4 in. across at the base. Central China. (Arnold Arboretum.)

***Amelanchier rubescens.** (*Bean, T. & S.* i. 190.) Rosaceae. H. A shrub with downy branchlets. Leaves orbicular or broadly obovate, ½–in. long, glaucous and covered with a fine close down beneath, sharply toothed. Flowers pure white, ½–⅝ in. across, 3 to 6 together in a short raceme. South-western United States. (Kew.)

***Anemone rupicola.** (*G. M.* 1914, 642 f.) Ranunculaceae. H. Rootstock long, slender, woody. Leaves long stalked, 3-partite; segments sharply and coarsely toothed or 3-lobed. Scape 12 in. long. Involucral leaves almost sessile, 3-lobed to the middle, with toothed and cut segments. Flowers showy, white, 1–2 in. across. A re-introduction. See *Hook. f. Fl. Brit. Ind.* i. 8. Himalaya. (Bees, Ltd.)

***Angraecum birrimense.** (*K. B.* 1914, 214.) Orchidaceae. S. Flowers smaller than in *A. Eichlerianum*, with narrower lip and a straight spur. The flowers are showy and have subspreading linear-lanceolate sepals and petals 1¼–1½ in. long. Lip obovate, 1 in. long and broad. Gold Coast. (Kew.)

Aquilegia desertorum. (*G. C.* 1914, lv. 67.) Ranunculaceae. H. "A dwarf species with red flowers of the type of *A. canadensis*, and with an enormous root." New Mexico. (T. D. A. Cockerell, Boulder, Colorado, U.S.A.)

***Aristolochia gigantea.** (*B. M.* t. 8542.) Aristolochiaceae. S. This is the true *A. gigantea*. The plant figured in *B. M.* t. 4221 under that name is *A. grandiflora* var. *Hookeri*; in that the apex of the large perianth-limb is long-tailed, while in *A. gigantea* it is obtuse. Perianth-limb elliptic, deeply cordate, 9 in. long, 6–6½ in. broad, brownish-purple with pale yellow reticulations. Its flowers are fragrant. Brazil. (Sir Frank Crisp.)

Arundina subsessilis. (*K. B.* 1914, 374.) Orchidaceae. S. A completely herbaceous species easily distinguished by having the flowers subsessile at the apex of the branches. The flowers are nearly white, with purple at the tips of the sepals and petals and on the limb of the lip, and yellow keels. Upper Burma. (H. J. Elwes.)

***Aster batangensis.** (*G. C.* 1914, lvi. 186, f. 74.) Compositae. H. A compact little shrubby plant about 1 ft. high, very free-flowering. Flower-heads bright purple, 1½ in. across; ray-florets longer and narrower than is usual in the genus. It flowers in May and June. Western China. (Bees, Ltd.)

***Begonia Bunchii.** (*Haage & Schmidt, Cat.* 1914, 211, name only.) Begoniaceae. G. Very similar to *B. metallica* var. *crispa*. Leaves reniform, up to 3½ in. long and 6 in. broad, lobed, undulate and crisped on the margin, shining yellowish-green and glabrous above, rose-purple beneath, and very sparingly furnished with brown chaffy hairs on the principal veins, ciliate and with tufts of brown hairs here and there on the margin; petiole up to 4½ in. long, sparingly clothed with long slender chaffy hairs. Inflorescence a lax cyme. Peduncle erect, about 5 in. long. Flowers (all female in Kew plant) pale rose. Perianth-segments 2, suborbicular, about ¼ in. across. Fruit rather broadly and subequally 3-winged. (Haage & Schmidt, Erfurt.)

***Begonia lophoptera.** (*K. B.* 1914, 28.) G. A new species differing from *B. ciliata* in its larger leaves and bracts, in having vivid scarlet flowers, and a capsule of which the upper wing terminates in a thickened toothed and pilose crest. Only the male flowers are known. These have 2 segments which are broadly elliptic and 5–7½ in. long. Peru. (F. Sander & Sons.)

Begonia venusta. (*B. H.* 1914, 134; *Lemoine, Cat.* 1914, n. 187, 3.) G. Garden hybrid between *B. decora*

and *B. Bowringiana*. (V. Lemoine & Son, Nancy.)

***Berberis Prattii.** (*B. M.* t. 8549.) Berberidaceae. H. Belongs to the same group as *B. polyantha* and *B. brevipaniculata*, differing from the former chiefly in its narrower panicles, and from the latter in its larger serrate leaves, which are not glaucous beneath. It is a shrub of dense growth, with obovate-oblong or obovate leaves, $\frac{1}{3}$–$1\frac{1}{3}$ in. long, narrow panicles of yellow flowers, and ellipsoid salmon-red berries, which are very freely produced. Western China. (J. Veitch & Sons.)

***Berberis yunnanensis.** (*Bean, T. & S.* i. 253.) H. A deciduous shrub 3–6 ft. high, with a dense rounded habit. Leaves obovate, sometimes almost orbicular, $\frac{3}{4}$–$1\frac{1}{2}$ in. long, $\frac{1}{3}$–1 in. broad, mostly entire. Flowers 3 to 8 in a cluster, pale yellow, $\frac{3}{4}$ in. across. Berries oval, bright red, $\frac{1}{2}$ in. long. South-Western China. (M. L. de Vilmorin, Les Barres, France.) [The plant included in the 1908 list as *B. yunnanensis* (*B. M.* t. 8224) is *B. diaphana*, Maxim.]

Berchemia flavescens. (*Bean, T. & S.* i. 253.) Rhamnaceae. H. A climbing deciduous shrub. Leaves 2–6 in long, 1–$2\frac{3}{4}$ in. broad, rounded or broadly tapered at the base, narrowed at the apex. Flowers white, $\frac{1}{6}$ in. across, produced in pyramidal panicles $1\frac{1}{2}$–4 in. long. Himalaya, Tibet, and Western China. (J. Veitch & Sons.)

***Betula alaskana.** (*Bean, T. & S.* i. 255.) Cupuliferae. H. A tree 30–40 ft. high. Young shoots thickly covered with viscid worts, glabrous. Leaves triangular-ovate, acuminate, $1\frac{1}{2}$–3 in. long, 1–2 in. broad, coarsely and often doubly toothed; petiole $\frac{1}{2}$–1 in. long, reddish. Fruiting catkins 1–$1\frac{1}{4}$ in. long. Alaska. (Arnold Arboretum.)

***Betula fontinalis.** (*Bean, T. & S.* i. 257.) H. A shrub 15–20 ft. high, or occasionally a tree; bark almost black, not peeling; young shoots resinous, warted. Leaves glandular, broadly ovate, rounded or slightly cordate at the base, pointed, double-toothed, 1–2 in. long, $\frac{3}{4}$–$1\frac{1}{2}$ in. broad; petiole $\frac{1}{4}$–$\frac{1}{2}$ in. long. Male catkins up to 2 in. long. Fruiting catkins 1–$1\frac{1}{4}$ long. Western North America. (Arnold Arboretum.)

***Betula kenaica.** (*Bean, T. & S.* i. 261.) H. Differs from *B. papyrifera* in the fruit-scales being hairy on the margin, and in the smaller leaves. Syn. *B. papyrifera*, var. *kenaica*, Henry. Alaska. (Kew.)

***Betula Wilsonii.** (*K. B.* 1914, 30.) H. A distinct new species, 6–10 ft. high, remarkable on account of its many-nerved hirsute leaves. These are ovate, $\frac{3}{4}$ $2\frac{1}{2}$ in. long, with 12–22 parallel nerves on each side of the midrib. Western China. (Arnold Arboretum; Kew.)

Bomarea Banksii. (*G. C.* 1914, lv. 390, f. 176.) Amaryllidaceae. G. Garden hybrid between *B. Caldasiana* and *B. patacocensis*. (Cambridge B. G.)

***Brachystelma linearifolium.** (*K. B.* 1914, 248.) Asclepiadaceae. S. A perennial herb with a tuberous rhizome. Stem erect, branched below, 5 in. high. Leaves numerous, linear, up to $3\frac{1}{3}$ in. long. Flowers axillary, solitary. Corolla purple; tube very short; lobes spreading, linear-oblong, about $\frac{3}{4}$ in. long. Rhodesia. (Kew.)

Brasso-catlaelia pervenusta. (*O. W.* iv. 208.) Orchidaceae. G. Garden hybrid between *Laelio-cattleya bletchleyensis* and *Brassavola Digbyana*. (Charlesworth & Co.)

Brasso-cattleya Massangeana. (*O. W.* iv. 162.) Orchidaceae. G. Garden hybrid between *Cattleya Trianae* and *B.-c. Mrs. Leemann*. (T. Pauwels, Meirelbeke, Ghent.)

Brasso-cattleya pervenusta. (*O. W.* iv. 208.) G. Garden hybrid between *Brassavola Digbyana* and *Cattleya Fabia*. (F. Sander & Sons.)

Brasso-cattleya Rex. (*O. R.* 1914, 214; *O. W.* iv. 235.) G. Garden hybrid between *Cattleya Rex* and *Brassavola Digbyana*. (W. P. Burkinshaw.)

Brasso-cattleya sulphurea. (*O. R.* 1914, 368; *O. W.* v. 57.) G. Garden hybrid between *Cattleya Gaskelliana alba* and *B.-c. Mrs. Leemann*. (R. Ashworth.)

***Brittonastrum ionocalyx.** (*G. C.* 1914, lvi. 109, f. 47.) Labiatae. H. or H. H. An erect much-branched herb up to 3 ft. high, having some resemblance to *Cedronella cana*. Leaves deltoid-ovate, cordate at the base, $1\frac{1}{4}$–$2\frac{1}{4}$ in. long, 1–2 in. broad, crenate, purplish beneath when young. Inflorescences terminal, 4-7 in. long, bearing 8 to 14 crowded whorls of rose-pink flowers about 1 in. long. Mexico. (Edinburgh B. G.)

***Buddleia variabilis,** var. **Wilsonii.** (*G. C.* 1904, xxxvi. 155; *Bean, T. & S.* i. 274.) Loganiaceae. H. Flowers rosy lilac, with a deep orange centre. Corolla-lobes erect. Central China. (J. Veitch & Sons.)

Bulbophyllum amplebracteatum. (*O. R.* 1914, 199.) Orchidaceae. S. Allied to *B. orthoglossum*. It has a similar spike, with compressed bracts and 2 or 3 flowers, but the petals are much more acuminate, and the lip suddenly narrows below the middle and is prolonged in a recurved tail-like appendage. Malay Archipelago. (F. Sander & Sons.)

***Bulbophyllum elatius.** (*O. R.* 1914, 298.) S. Plant without pseudobulbs. Leaves erect, oblong, leathery, 9–12 in. long, narrowed at the base into a stout petiole 4–5 in. long. Scapes basal, about as long as the leaves, bearing a narrow spike crowded with white flowers. Borneo and Sumatra. (F. Sander & Sons.)

***Bulbophyllum Fletcherianum.** (*G. C.* 1914, lv. 320, f. 142; *O. R.* 1914, 164.) S. Pseudobulbs oblong, ¾–2¼ in. across, 1-leaved, transversely wrinkled and streaked with purple lines. Leaves elliptic or oblong, pendulous, nearly 1 ft. long, purplish-green. Flowers in a cluster of about 7, dull lurid purple, with whitish splashes, very large for the genus. Lateral sepals acuminate, about 4 in. long; dorsal sepal about half as long. Lip broad and fleshy. New Guinea. (Rev. J. C. B. Fletcher.) [*Cirrhopetalum Fletcherianum*; B. M. t. 8600.]

Bulbophyllum rigidum. (*O. R.* 1914, 315.) S. Plant without pseudobulbs. Leaves erect, 6–10 in. long, narrowed to the petiole. Scapes nearly as long as the leaves. Inflorescence racemose, lax. Flowers brownish-yellow or greenish, with a few brown streaks at the base. Allied to *B. apodum*, and is the same as *B. conchiferum*, Hook. f., but not of Reichenbach. It was in cultivation in 1894. (Sikkim Himalaya.) (F. Sander & Sons.)

Buxus microphylla, var. **sinica.** (*Pl. Wils.* ii. 165.) Euphorbiaceae. H. Distinguished from the type by its pubescent branches and larger leaves. It has been met with in cultivation in America under the name of *B. Fortunei*, but it is distinct from *B. Fortunei*, Carr. (China.)

Calanthe Branchii. (*G. C.* 1914, lvi. 342; *l.c.* 357, as *C. Brianchii*; *l.c.* 391, as *C. Brianchii*; *O. R.* 1914, 366.) Orchidaceae. G. Garden hybrid between *C. Textori* and *C. Wm. Murray*. (C. J. Lucas.)

***Calanthe kewensis.** (*O.R.* 1914, 31.) S. Garden hybrid between *C. Veitchii* and *C. rubens*. (Kew.)

***Calceolaria angustifolia x plantaginea.** (*G. C.* 1914, lv. 319.) Scrophulariaceae. G. Garden hybrid. (John Innes Hort. Inst.)

***Calceolaria Ballii.** (*G. C.* 1914, lv. 102, f. 46.) G. Garden hybrid between *C. deflexa* and *C. Forgetii*. (Glasnevin B.G.)

***Campanula cenisia alba.** (*G. C.* 1914, lv. 287; *G. M.* 1914, 351.) Campanulaceae. H. A form with pure white flowers. (R. Tucker & Sons.)

***Campanula Hohenackeri.** (*G. C.* 1914, lv. 425; *G. M.* 1914, 478, 495, f.) H. A very free-flowering biennial or perennial. Leaves lanceolate. Inflorescences 1½–2½ ft. high, semi-erect. Flowers elongated-campanulate, sky-blue, pendulous on slender branches. Caucasus, Armenia, etc. (Piper & Sons.) [*C. sibirica*, L., var. *major*, Boiss.]

Catasetum Pflanzii. (*Orchis*, 1914, 18.) Orchidaceae. S. Plant up to 18 in. high. Pseudobulbs cylindric, about 5 in. long when mature, 4–5 leaved. Leaves elliptic, acuminate, about 1 ft. long, 2½–3 in. broad in the middle. Racemes basal, loosely about 6-flowered. Peduncles 5 in. long. Male flowers similar to those of *C. atratum*. Sepals and petals about 1¼ in. long, green-yellow with red dots. Lip yellow. Female flowers not described. See *Fedde, Repertorium* xi. 45. Bolivia. (P. Wrede.)

Cattleya ardens. (*J. H. F.* 1914, 384.) Orchidaceae. G. Garden hybrid between *Laelio-cattleya Canhamiana* and *Cattleya Mossiae Quo Vadis*. (E. Bert & Son, Bois-Colombes, Seine, France.)

Cattleya birex. (*G. C.* 1914, lvi. 319.) G. Garden hybrid between *C. bicolor* and *C. Rex*. (C. J. Lucas.)

Cattleya Cravesiana. (*G. C.* 1914, lv. 294.) G. Garden hybrid between *C. Mossiae* and *C. Luddemanniana*. (F. Sander & Sons.)

Cattleya Hardyana rubens. (*G. C.* 1914, lvi. 99; *O. R.* 1914, 248.) G. Sepals and petals light rose. Lip

large, ruby-crimson, with much yellow in the throat and a narrow lilac-tinted margin. (J. Gurney Fowler.)

Cattleya Leopoldii alba. (*O. R.* 1914, 362; *O. W.* v. 2.) G. Sepals and petals light green, without any spots. Lip pure white. (F. Sander & Sons.)

Cattleya Maronis. (*O. W.* v. 40.) G. Garden hybrid between *C. Maronii* and *C. Iris.* (Armstrong & Brown.)

Cattleya venusta. (*O. W.* v. 15.) G. Garden hybrid between *C. Armstrongiae* and *C. intricata.* (H. T. Pitt.)

***Centaurea moschata rosea.** (*Haage & Schmidt, Cat.* 1914, 195, f.) Compositae. H. A form in which the flowers are at first reddish-white, with pale rose filaments and styles; after a few days the colour changes to a delicate rose. (Haage & Schmidt, Erfurt.)

Cephalotaxus drupacea, var **sinensis**, f. **globosa.** (*Pl. Wils.* ii. 4.) Coniferae. H. In this form the fruit is globose or subglobose. The var. *sinensis* differs from the type in having narrowly lanceolate leaves tapering to a sharp acuminate point. Central China. (Arnold Arboretum.)

***Ceratostigma Willmottianum.** (*B. M.* t. 8591.) Plumbaginaceae. H. A new species closely resembling *C. plumbaginoides* but the leaves are hispidly hairy on both sides and on the margin, the flowers are of rather a paler blue, and the anthers are scarcely exserted. It is a shrub growing 5 ft. high or more. Western China. (Miss Willmott.)

***Cercis racemosa.** (*J. R. H. S.* xl. 223; *Bean, T. & S.* i. 335.) Leguminosae. H. Differs from the Judas Tree in having its flowers in short racemes instead of in close clusters, and it may be distinguished from all the other species of the genus by its very downy leaves and young shoots. The racemes are up to 4 in. long, with 30 to 40 rose-coloured flowers. Central China. (Arnold Arboretum; Kew.)

Cereus Martinii, var. **perviridis.** (*M. K.* 1914, 72.) Cactaceae. G. More slender in growth than the type, the branches are quite terete and are uniformly light green, and the flowers, which have a pleasant odour, remain open almost twice as long. Possibly a natural hybrid of which *C. Martinii* is a parent. Paraguay. (Haage & Schmidt, Erfurt.)

Cheiranthus linifolius. See **Erysimum linifolium.**

Chionanthus Duclouxii. (*B. S. D. F.* 1914, 72, f.) Oleaceae. H. A shrub. Leaves 3⅓ 4 in. long, 2½ in. broad, shortly lanceolate and obtuse or ovate and acuminate, densely and acutely serrate, coriaceous, dull green above, pale beneath, pubescent on the nerves; petiole short, purple. Flowers not described. Fruits not appreciably different from those of *C. virginica.* Yunnan, China. (R. Hickel, Versailles.)

Cirrhopetalum Fletcherianum. See **Bulbophyllum Fletcherianum.**

***Cirrhopetalum formosanum.** (*K. B.* 1914, 372.) Orchidaceae. S. Differs from *C. elatum* in having broader leaves, shorter scapes, only about 3¾ in. long and usually 2-flowered, and longer lateral sepals. The flowers are straw-yellow, with a deep yellow lip and a suffusion of pink in the petals. Formosa. (Kew.)

Cirrhopetalum Trimenii. (*G. C.* 1914, lv. 247.) S. A dwarf evergreen species. Scapes slender, about 3 in. high. Flowers 7–9 in a very short raceme, yellowish-white with purple spots on the back of the dorsal sepal. Lip primrose-yellow with a few rose-coloured dots at the base. Ceylon. (Hon. N. C. Rothschild.)

***Cleisostoma spicatum.** (*G. C.* 1914, lv. 20.) Orchidaceae. S. A strong-growing species with thick dark-green leaves 4–6 in. long and 1–2 in. broad. Inflorescence bearing more than 40 flowers; rhachis decurved, stout. Flowers ½ in. across. Sepals and petals red, with a thin yellow line up the middle of the petals and lateral sepals. Lip whitish, prolonged into spur ½ in. long. Syn. *Saccolabium densiflorum.* Lindl. Malaya. (Hon. N. C. Rothschild.)

Clematis acutangula. (*Bean, T. & S.* i. 354.) Ranunculaceae. H. A deciduous climbing shrub. Stems slender, sharply angled, reddish-purple, very viscid when young. Leaves doubly pinnate, 6–9 in. long; leaflets ovate-lanceolate, 1–2 in. long, coarsely toothed or few-lobed. Racemes 1½–3 in. long. Flowers bell-shaped, 1 in. broad, ⅝ in. long, lilac. Sepals 4. Himalaya and China. (J. Veitch & Sons.)

***Clematis glauca,** var. **akebioides.** (*Bean, T. & S.* i. 364.) H. Nearly allied to *C. orientalis*, but both the type and the variety differ from it in having the sepals downy on the margins only. Flowers 1½–1¾ in. across, deep orange-yellow. It is more vigorous than the type, and flowers late into October. Western China. (J. Veitch & Sons.)

Clematis Couriana, var. **Finetii.** (*Pl. Wils.* i. 339; *G. C.* 1914, lv. 373.) H. An autumn-flowering plant with large panicles of small white flowers. It differs from the type in the achenes, which are glabrous, dark brown, orbicular-ovoid and compressed. Central China. (Arnold Arboretum; Hon. Vicary Gibbs.)

Clematis montana superba. (*G. C.* 1914, lv. 287, f. 127; *G. M.* 1914, 370.) H. Flowers much larger than in the type, the largest being more than 3 in. across. (G. Jackman & Sons.)

***Clematis Rehderiana.** (*K. B.* 1914, 150; *Bean, T. & S.* i. 366.) H. This is a new name for the plant included in the list of 1910 as *C. nutans*.

Clematis Spooneri. (*Pl. Wils.* i. 334; *J. R. H. S.* xl. 223; *Gard.* 1914, 490.) H. A new species closely allied to *C. montana*, of which it has been regarded as a variety (*sericea*). It differs in its relatively thick leaves, which are densely covered with yellowish silky hairs, silky-hairy flowers, and in its densely pilose achenes. Western China. (Arnold Arboretum.)

***Clematis Veitchiana.** (*K. B.* 1914, 151; *Bean, T. & S.* i. 366.) H. The same as *C. nutans* var. *thyrsoidea* in the list of 1913.

***Clematis verrieriensis.** (*G. C.* 1914, lv. 393, f. 179.) H. Garden hybrid between *C. chrysocoma* and *C. montana rubens*. (Vilmorin-Andrieux & Co., Verrières-le-Buisson, France.) [Syn. *C. verdrariensis*; R. H. 1914, 335; J. H. F. 1914, 385.]

Coelogyne annamensis. (*K. B.* 1914, 211.) Orchidaceae. S. Near *C. brunnea*, but it has fusiform pseudobulbs, smaller flowers, and an unequally 3-keeled lip. The flowers are about 1½ in. long, with pale buff-yellow sepals and petals, and a rather darker lip, which has brown nerves on the side lobes, some orange-brown on the front lobe, and flesh-coloured keels. Annam. (Glasnevin B. G.)

***Coelogyne brachyptera.** (*B. M.* t. 8582.) S. An epiphyte with elongated somewhat 4-angled pseudobulbs 3½–6 in. long. Leaves elliptic-lanceolate, 5–6 in. long. Scapes terminal, erect. Racemes about 7-flowered. Flowers showy, greenish-yellow, with an orange-coloured disk on the lip. Sepals and petals 1–1½ in. long. Lip 3-lobed, about 1 in. long. A re-introduction; it was in cultivation in 1881. Burma. (Kew.)

***Coelogyne siamensis.** (*K. B.* 1914, 373.) S. Distinguished from *C. lentiginosa* by the larger flowers and the wart-like papillae of the keel of the lip. The sepals and petals are 1¼–1½ in. long, pale green, and the lip 1 in. long, light yellow, with a broad dark brown margin to the side lobes and some brown streaks and dots on the disk. Siam. (Kew.)

Coleus splendidus. (*R. H.* 1914. 81, ff. 19-20.) Labiatae. G. A tuberous species. Stem usually simple at the base and branched a few inches from the soil, reaching about 2 ft. in height. Leaves variable in shape, generally linear, 2½–5 in. long, ½ ¾ in. broad, pubescent, toothed in the upper part. Racemes terminal, erect, 5-8 in. long, 2–2½ in. broad at the base. Flowers about ½ in. long, deep violet-blue. French Guinea. (Paris B. G.)

***Columnea Lemoinei.** (*R. H.* 1914, 134; *Lemoine, Cat.* 1914, n. 187, 3.) Gesneraceae. S. Garden hybrid between *C. magnifica* and *C. glabra*. (V. Lemoine & Son, Nancy.)

***Cornus sessilis.** (*Bean, T. & S.* i. 393.) Cornaceae. H. Tree 10–15 ft. high. Leaves shortly stalked, ovate, 1½–3 in. long. Flowers ¼ in. across, yellow, crowded in sessile umbels, which are at first enclosed by 4 ovate bracts ½ in. long. North California. (Kew.)

***Cotoneaster acutifolia,** var. **villosula.** (*Pl. Wils.* i. 158; *Bean, T. & S.* i. 405.) Rosaceae. H. Easily distinguished from the type by the larger more acuminate more or less villous leaves, more densely pubescent calyx, and by the somewhat villous apex of the fruits. Central and Western China. (J. Veitch & Sons.)

***Cotoneaster hupehensis.** (*Pl. Wils.* i. 169; *M. G. Z.* 1914, 14.) H. Similar to *C. multiflora*, from which it may be distinguished by the densely tomentose lower surface of

the leaves and the villous inflorescence. It is very fine when in flower, and its red globose fruits are ornamental. Central China. (Arnold Arboretum.)

***Cotoneaster multiflora,** var. **calocarpa**. (*Pl. Wils.* i. 170; *M. G. Z.* 1914, 9, f. 2.) H. Differs from the type in the larger and comparatively narrow leaves, which are slightly hairy beneath, and in the larger fruits. Western China. (Arnold Arboretum.)

***Cotoneaster nitens.** (*Pl. Wils.* i. 156; *M. G. Z.* 1914, 7.) H. Nearest allied to *C. divaricata*, and characterised by its broadly oval to suborbicular leaves, usually 5–6 lin. long and 4½–5½ lin. broad, shining green and glabrous above, and nearly so beneath, and by its nearly black fruits. Western China. (Arnold Arboretum.)

***Cotoneaster racemiflora,** var. **microcarpa**. (*Pl. Wils.* i. 169; *M. G. Z.* 1914, 14.) H. Easily distinguished from the typical form, better known as *C. nummularia*, by its small ovoid fruits, which are only about ¼ in. long and scarcely so broad. Western China. (Arnold Arboretum.)

***Cotoneaster salicifolia,** var. **floccosa**. (*Pl. Wils.* i. 173; *M. G. Z.* 1914, 14.) H. The correct name of the plant included in the list of 1913 as *C. salicifolia glaciosa*.

***Cotoneaster turbinata**. (*B. M.* t. 8546.) H. A new species differing from *C. pannosa* and its allies by its top-shaped fruit, and from the other species in cultivation by its flowering so late as July. It is a very vigorous shrub with oblanceolate or ovate-lanceolate leaves ⅔–1¾ in. long, compact many-flowered inflorescences, and red fruits ⅙ in. long. Central China. (M. L. de Vilmorin, Les Barres, France; Kew.)

***Cotyledon paraguayensis.** (*K. B.* 1914, 208.) Crassulaceae. G. Stem short, 5 lin. thick, glabrous. Leaves crowded, the upper in a rosette, sessile, cuneate-obovate, 1¾–3 in. long. Peduncles axillary, 2 in. long. Corolla ¾ in. across; tube 2 lin. long, campanulate, pale green; lobes ovate-lanceolate, acute, white, 3½ lin. long. Paraguay. (Kew.)

***Crassula clavata.** (*K. B.* 1914, 167.) Crassulaceae. G. Very distinct from all other species of the genus in having rhomboid-clubshaped leaves, sessile flowers in a head about ½ in. across, and petals with an oblong-ovoid fleshy appendage on the back at the apex. The very small flowers are white. South Africa. (Kew.)

***Crataegus brachyacantha.** (*Bean, T. & S.* i. 422.) Rosaceae. H. A short-spined species remarkable in having bright blue fruits. It is a deciduous tree with oval or ovate leaves 1–2 in. long, and small flowers the petals of which become orange-coloured with age. Introduced in 1900. Central United States.

***Crataegus Holmesiana.** (*Bean, T. & S.* i. 423.) H. Allied to *C. coccinea*, under which name it was probably in cultivation previous to 1901, when it was introduced as *C. Holmesiana*. The flower-stalks are smooth or nearly so, and the flowers have only 5 to 7 stamens. Eastern North America.

Crocus Thomasianus Weaveri. (*G. C.* 1914, lv. 153.) Iridaceae. H. "A distinct purple-red variety." (Wargrave Hardy Plant Nursery. [*Crocus sativus*, L., var.]

Cunninghamia Konishii. (*Bean, T. & S.* i. 441.) Coniferae. G. Very distinct from *C. sinensis*, the leaves being only ⅓–½ in. long and $\frac{1}{16}$ in. broad, linear-lanceolate and curved. Formosa. (H. Clinton Baker.)

Cymbidium amabile. (*G. C.* 1914, lv. 191; *O. W.* iv. 162.) Orchidaceae. G. Garden hybrid between *C. Lowio-Mastersii* and *C. insigne Sanderi*. (F. Sander & Sons.)

Cymbidium Coningsbyanum. (*G. C.* 1914, lv. 46; *O. W.* iv. 112, 117.) G. Garden hybrid between *C. grandiflorum* and *C. insigne*. (G. Hamilton-Smith.)

Cymbidium Cooperi. (*O. R.* 1914, 94.) G. Natural hybrid between *C. insigne* and *C. Schroederi*. (G. Hamilton-Smith. [The same hybrid, raised artificially, is included in the list for 1911 under the name of *C. glebelandsense*.]

Cymbidium eburneo-insigne. (*R. H.* 1914, 122; *J. H. F.* 1914, 92.) G. Garden hybrid. (Baron Ed. de Rothschild, Chateau d'Armainvilliers, Gretz, France.)

Cymbidium Hanburyanum. (*O. W.* v. 40.) G. Garden hybrid between *C. Tracyanum* and *C. erythrostylum*. (F. J. Hanbury.)

Cypripedium Floryi. (*O. R.* 1914, 23; *O. W.* iv. 92.) Orchidaceae. S.

Garden hybrid between *C. Niobe* and *C. Countess of Carnarvon.* (Flory & Black.) [*Paphiopedilum.*]

***Cypripedium macranthum album.** (*O. R.* 1914, 180; *G. C.* 1914, lv. 321. Orchidaceae. H. Flowers pure white. (G. Reuthe.) [*C. macranthon* var.]

Cypripedium mirum. (*O. R.* 1914, 26.) S. Garden hybrid between the New Hall Hey variety of *C. Euryades* and *C. Alcibiades.* (W. Thompson.) [*Paphiopedilum.*]

Cypripedium Pereirae. (*G. C.* 1914, lv. 326.) S. Supposed to be a natural hybrid between *C. niveum* and *C. Exul.* Island north of Penang. (J. D. Pereira, Singapore.) [*Paphiopedilum.*]

Cypripedium pictum. (*G. C.* 1914, lvi. 195; *O. W.* v. 15.) S. Garden hybrid between *C. nitens* and *C. glaucophyllum.* (H. T. Pitt.) [*Paphiopedilum.*]

Cypripedium Susannae. (*G. C.* 1914, lv. 410.) S. Garden hybrid between *C. glaucophyllum* and *C. Fairrieanum.* (Armstrong & Brown.) [*Paphiopedilum.*]

Cypripedium veganum. (*G. C.* 1914, lv. 50.) H. Allied to *C. pubescens.* The plants form large masses several feet across. Flowers large with a bright yellow lip. New Mexico. (T. D. A. Cockerell, Boulder, Colorado, U.S.A.)

***Cytisus pallidus.** (*B. M.* t. 8578.) Leguminosae. G. Shrub 4–10 ft. high. Leaves 3-foliolate; petiole $\frac{1}{3}$–$1\frac{1}{4}$ in. long; leaflets oblanceolate or narrowly oblanceolate, $\frac{2}{3}$–$1\frac{3}{4}$ in. long, pubescent. Flowers about 10, in loose terminal racemes, over $\frac{1}{2}$ in. long, yellow, with a reddish stripe on the middle of the standard. [Syns. *C. linifolius*, Lamk., var. *pallidus*, Briq.; *Genista splendens*, Webb & Berth.] Canary Islands. (Kew.)

Dendrobium Bartelsianum. (*O. R.* 1914, 157.) Orchidaceae. S. Garden hybrid between *D. Wiganiae* and the Gatton Park variety of *D. Wiganianum.* (Sir J. Colman.)

Dendrobium Bassattii. (*G. C.* 1914, lv. 192; *O. R.* 1914, 116.) S. Garden hybrid between *D. Rolfeae* and *D. melanodiscus Salteri.* (Mrs. T. B. Haywood.)

Dendrobium Frederickii. (*G. C.* 1914, lv. 289; *O. R.* 1914, 159.) S. Garden hybrid between *D. fimbriatum* and *D. Thwaitesiae.* (R. G. Thwaites.)

Dendrobium pinifolium. (*O. R.* 1914, 347.) S. Nearly allied to *D. pachyglossum*, which it resembles in habit, but the flowers are larger and the sepals and petals are closely lined with red-brown on a light yellow ground. Stem about 6 in. long. Leaves narrow, acute, very rigid. Lateral sepals and the narrow petals much reflexed. Lip honey-yellow, brownish in front. Borneo. (Hon. N. C. Rothschild; Kew.)

Dendrobium plumosum. (*O. R.* 1914, 157.) S. Garden hybrid between *D. Cybele* and *D. signatum aurcum.* (Sir J. Colman.)

Dendrobium Tofftii. (*O. R.* 1914, 360; 1915, 9, f. 1; *O. W.* v. 53.) S. Similar to *D. undulatum* in habit and shape of leaves. Stems up to 5 ft. high, and the inflorescence, when fully developed, about $1\frac{3}{4}$ ft. long, bearing many flowers, but sometimes much reduced and with few flowers. Sepals whitish. Petals longer, twisted, tinged with lilac. Lip broad, tinged and veined with purple. North Queensland. (Sir J. Colman.)

Dianthus superbus roseus. (*G. M.* 1914, 532.) Caryophyllaceae. H. A form with deep rose flowers. (P. S. Hayward.)

***Dianthus tenuis.** (*K. B.* 1914, 205.) Distinguished from *D. nitidus* by its 1-flowered stem, spreading leaves, calycine bracts $2\frac{1}{2}$ lin. long, and by its fragrant white flowers, which are nearly 1 in. across. The plant was raised from seeds received under the name of *D. Tenorei.* Possibly Italy. (Kew.)

***Dimorphotheca sinuata.** (*Jard.* 1914, 140.) Compositae. G. An annual herb forming tufts up to $1\frac{3}{4}$ ft. across. Leaves sinuate, toothed, bright green. Flower-heads $2\frac{1}{2}$–$3\frac{1}{3}$ in. across, chamois-yellow with a satiny appearance, purple on the reverse of the ray-florets; disc bluish. South-West Africa. (Haage & Schmidt, Erfurt.)

Echeveria leucotricha. (*M. K.* 1914, 65, f.) Crassulaceae. G. A caulescent branched plant with the stem and branches densely covered with fox-brown hairs. Leaves in a loose rosette, oblong, elliptic or lanceolate, $2\frac{1}{2}$–$3\frac{1}{3}$ in long, fleshy, densely tomentose with rather long soft white

hairs, fox-brown at the apex. Flowering-branches axillary, loosely leafy, 12–16 in. long. Flowers in a simple spike. Sepals 5, lanceolate, free to the base, 5 lin. long. Petals 5, linear-lanceolate, reflexed at the apex, cinnabar-red, up to ¾ in. long. Mexico. (Darmstadt B. G.)

*__Echium Perezii.__ (*K. B.* 1914, 210.) Boraginaceae. G. Distinguished from *E. Wildpretii* by the lax thyrsus, conspicuously pedunculate elongated cymes, paler corolla, longer style-branches, and by other characters of the inflorescence. The leafblade is decurrent to the base. Canary Islands. (Dr. G. V. Perez, Tenerife; Kew.)

*__Enkianthus campanulatus,__ var. __Palibinii.__ (*Bean, T. & S.* i. 512.) Ericaceae. H. This is the plant figured in *B. M.* t. 7059 as *E. campanulatus*. It differs from the type in having rather smaller deep red flowers produced in a distinct raceme. Japan. (J. Veitch & Sons.)

*__Epidendrum porpax.__ (*O. R.* 1914, 318.) Orchidaceae. G. A dwarf plant, closely allied to *E. Mattheusii*. Stems many, about 2 in. high. Leaves oblong, about ½ in. long. Flowers solitary, terminal, with a broad purple lip and much paler sepals and petals. Costa Rica. (Kew.)

*__Epidendrum profusum.__ (*B. M.* t. 8551.) G. A new species allied to *E. ambiguum*, from which it may be distinguished by the denser panicle, smaller flowers, broader sepals and petals, and by the minutely crenulate lobes of the lip. The flowers are about 1¾ in. across, with pale yellowish-green sepals and petals and a white lip which is streaked with purple near the tip. Probably Mexico. (F. Sander & Sons; Kew.)

*__Epilaelia Medusae.__ (*G. C.* 1914, lv. 215.) Orchidaceae. G. Garden hybrid between *Laelia cinnabarina* and *Epidendrum ciliare*. (Lord Rothschild.)

__Eria pilifera.__ (*O. R.* 1914, 171.) Orchidaceae. S. Stems cylindric. Leaves lanceolate, distichous, short. Inflorescence reduced to a single flower, with a basal rosette of about 5 spreading narrow dull yellow bracts. Flowers white, covered with yellow papillae on the small rounded front lobe of the lip. Malaya. (Glasnevin B. G.)

*__Eria sonkaris.__ (*O. R.* 1914, 263.) S. Stems erect, more than 1 ft. high, with 6 or 7 lanceolate-oblong coriaceous leaves about 6 in. long and 1¼ in. broad. Spikes erect, dense, 6 or 7 in. long. Pedicels woolly. Flowers woolly on the back, light yellow, with a few light reddish streaks on the side lobes of the 5-lobed lip. Malaya. (Kew.)

__Erica vulgaris Russelliana.__ (*G. C.* 1914, lv. 76.) Ericaceae. H. Growths at first red-tinted, later assuming a golden hue. (L. R. Russell.) [*Calluna vulgaris*, Salisb., var.]

__Erigeron speciosus giganteus.__ (*Jard.* 1914, 200, col. t.) Compositae. H. A very vigorous form, the stems reaching a height of nearly 3 ft. Flower-heads very broad. Ray-florets long and narrow, slightly reflexed at the tips, a delicate lilac-blue. (Cayeux & Leclerc, Vitry-sur-Seine, France.)

__Erysimum bracteatum.__ (*N. B. G. Edinb.* viii. 185.) Cruciferae. H. Remarkable for the more or less persistent bracts of the inflorescence; these extend almost to the apex or sometimes more than half-way up. Plant 2–3 ft. high. Leaves linear or narrowly linear-lanceolate, 2½–3¼ in. long. Flowers golden-yellow, in large racemes. South-Western China. (Bees, Ltd., Edinburgh B. G.).

*__Erysimum linifolium.__ (*G. C.* 1914, lv. 425; *G. M.* 1914, 477.) H. A perennial herb 1–1½ ft. high, forming large spreading masses. Leaves linear, sinuate on the margin, 3½ in. long, ¼ in. broad. Flowers lilac, ½ in. across, arranged in racemes. A re-introduction. It is recorded as having been first introduced in 1815. Spain. (C. Elliott; Glasnevin B. G.) [Syn. *Cheiranthus linifolius*; G. C. 1914, lvi. 186, 207, f. 73.]

*__Euonymus semipersistens.__ (*Bean, T. & S.* i. 543.) Celastraceae. H. Cultivated for many years as *E. Sieboldianus*. It is closely allied to *E. Bungeanus*, but it has firmer leaves, which persist until March unless the winter is severe, and its pink fruits are tapered at the base. China.

*__Euonymus Wilsonii.__ (*Bean, T. & S.* i. 543.) H. An evergreen shrub up to 20 ft. high. Leaves 3–6 in. long, 1–1¾ in. broad, lanceolate, toothed. Fruits 4-lobed, remarkable in being clothed with awl-shaped spines ⅓ in. long. Western China. (J. Veitch & Sons.)

__Euphorbia sinensis.__ (*K. B.* 1914, 329.) Euphorbiaceae. H. Stem erect, herbaceous, round, tomentose. Leaves

oblong-linear, up to 3½ in. long and ½ in. broad, acute at the apex, abruptly narrowed at the base. Umbel terminal, compound, 3 in. across. Involucre campanulate, 1½ lin. high; lobes 4 or 5, broadly semi-orbicular, very small. North-West China. (J. Veitch & Sons.)

***Evodia Daniellii.** (*Pl. Wils.* ii. 135; *Bean, T. & S.* i. 547.) Rutaceae. H. A tree. Leaves 9–15 in. long; leaflets 5–11, ovate-cordate to ovate-oblong, 2–5 in. long, glabrous above, pubescent on the midrib and in the axils of the veins beneath. North China and Corea. (Arnold Arboretum.)

***Evodia glauca.** (*Pl. Wils.* ii. 129; *Bean, T. & S.* i. 547.) H. A tree of medium size. Leaves 6–10 in. long; leaflets 5–15, oval-lanceolate to narrowly lanceolate, 1½–4 in. long, ½–1½ in. broad, distinct in their narrowness, in their glaucous undersurface and red petioles. Syn. *E. Fargesii*, Dode. China and Japan. (Arnold Arboretum.)

***Evodia Henryi.** (*Pl. Wils.* ii. 133; *Bean, T. & S.* i. 547.) H. A small tree easily recognised by its relatively small pyramidal inflorescence, rather large male flowers, and by the beak to the fruit. Leaves 6–12 in. long, with 3 to 9 ovate to ovate-lanceolate leaflets. Central China. (Arnold Arboretum.)

***Evodia hupehensis.** (*Pl. Wils.* ii. 133; *Bean, T. & S.* i. 547.) H. A tree reaching a larger size than any other species. Leaflets 5–9, narrowly ovate, 2½–5 in. long. Flowers in a broad panicle. Central China. (Arnold Arboretum.)

Evodia velutina. (*Pl. Wils.* ii. 134.) H. A very distinct new species, remarkable for the soft velvety pubescence on its leaves and young branches, and for the minute beak to its ripe capsule. It is a small tree with compound leaves having 3 to 5 pairs of oblong-lanceolate leaflets 2½–4 in. long. Flowers not described. Fruits small, purple-brown, in broad panicles. Western China. (Arnold Arboretum.)

Exochorda racemosa, var. **Wilsonii.** (*Pl. Wils.* i. 456: *R. H.* 1914, 209.) Rosaceae. H. Differs from the type (better known under the name of *E. grandiflora*) in being more vigorous and larger in every part. The petals of the fragrant white flowers are up to 1 in. long. Central China. (Arnold Arboretum.)

Exochorda serratifolia. (*R. H.* 1914, 209.) H. A very vigorous-growing species, distinct in having its leaves regularly and more deeply toothed. Flowers without odour, sometimes 2½ in. across. Petals narrower than in the hybrid between *E. Alberti* and *E. grandiflora*. North China. (M. L. de Vilmorin, Les Barres, France.)

***Fraxinus Biltmoreana.** (*Bean, T. & S.* i. 564.) Oleaceae. H. Closely allied to *F. americana*, under which name it has been for many years in cultivation. It differs chiefly in the dense pubescence of the young shoots, the pubescence persisting for two years. South-Eastern United States. (Kew, &c.)

***Fraxinus texensis.** (*Bean, T. & S.* i. 574.) H. Closely allied to *F. americana*, but its leaves usually have only 5 leaflets, which are broader and more shortly pointed. Texas. (Kew.)

Gaillardia pulchella, var. **albiflora.** (*G. C.* 1914, lv. 67.) Compositae. H. A variety in which the yellow of the ray-florets is replaced by white faintly tinged with cream. New Mexico. (T. D. A. Cockerell, Boulder, Colorado, U.S.A.)

***Gaultheria pyroloides,** var. **cuneata.** (*Pl. Wils.* i. 554; *G. C.* 1914, lv. 372.) Ericaceae. H. An attractive little evergreen plant, about 12 in. high, with obovate or oblong-obovate leaves and blue, afterwards snow-white, fruits. It differs from the type in its narrower leaves, more pubescent branchlets, and in its villous ovary and capsule. Western China. (Arnold Arboretum; Hon. Vicary Gibbs.)

***Gentiana aplata.** (*K. B.* 1914, 187.) Gentianaceae. H. Resembles *G. nivalis*, but the flowers are only about half the size. They are greenish-white with dark green lines and dots, 1 in. long and ¾ in. across. North China. (J. Veitch & Sons.)

Gentiana quinquenervia. (*K. B.* 1914, 328.) H. An erect glabrous herb with round stems. Leaves elliptic-lanceolate, acute, connate at the base, up to 5 in. long and 1½ in. broad. Flowers 4–11, in sessile clusters in the axils of the upper leaves. Corolla broadly funnel-shaped, 1 in. long; tube pale green outside, spotted with purple-green on the upper part inside: lobes broadly ovate-triangular, 2½ in. long, blue inside, green outside. North-West China. (J. Veitch & Sons.)

Gentiana rhodantha. (*G. C.* 1914, lv. 15.) H. A vigorous-growing species with a bushy habit and pink-white fringed flowers. Yunnan, China. Edinburgh B. G.)

Gentiana rigescens. (*G. C.* 1914, lv. 15.) H. A very floriferous late-flowering species with a bushy habit and persistent stems and leaves. Flowers violet-pink. Yunnan, China. (Bees, Ltd.)

***Gentiana septemfida**, var. **lagodechiana.** (*G. C.* 1914, lvi. 232, f. 92.) H. Stems ascending, 6–8 in. long, each bearing 2 to 4 flowers which are solitary on short pedicels in the axils of the upper leaves, instead of being in a head at the summit of the stem, as in the type. The flowers are about 1¾ in. across and are deep blue, with a paler throat and green or greenish-yellow spots. Eastern Caucasus. (Kew.)

Geranium Schiedeanum. (*M. G. Z.* 1914, 361, f.) Geraniaceae. H. ? Rootstock thick and fleshy. Basal leaves long-stalked, softly hairy, usually 1–2 in. across, trisect, with pinnately lobed segments. Stems prostrate, branched, slender, leafy, rather long. Flowers usually 2 together on long pedicels, reddish-violet to blue-violet with a paler reticulation, about as large as those of *G. sanguineum*, but flatter and with narrower petals. Mexico. (Darmstadt B. G.)

***Glaucidium palmatum.** (*G. C.* 1914, lv. 337.) Ranunculaceae. H. Plant rather slender, 1 ft. high or more. Leaves rounded, the lower long-stalked, the uppermost sessile, palmately lobed and coarsely serrate, cordate at the base, the largest 6 in. across or more. Flowers solitary, 2-3 in. across, with 4 broad mauve sepals and yellow stamens. Japan. (A. Perry.)

***Globularia incanescens.** (*G. C.* 1914, lvi. 69, f. 29.) Selaginaceae. H. A dwarf perennial. Leaves in a compact rosette, evergreen, oval, ½ in. long; petiole thin, ½–¾ in. long. Flowering-stems 2 in. high, leafy, bearing globose pale blue flower-heads rather more than ½ in. across. South Europe. (Glasnevin B. G.)

***Congora grossa.** (*B. M.* t. 8562.) Orchidaceae. S. Pseudobulbs clustered, ovoid, 8-angled, 2–2¾ in. long. Leaves elliptic or obovate-elliptic, 8–12 in. long, 2½–3½ in. broad. Scapes curved, pendent, 1½–2 ft. long, bearing long many-flowered open racemes. Flowers yellowish or whitish, with numerous red and purple spots. Sepals oblong-lanceolate, ¾–1 in. long. Petals falcately incurved, about ⅓ in long. Lip clawed; limb narrow, fleshy, 5-lobed. A re-introduction; it was in cultivation in 1877. Ecuador. (Kew.)

***Habenaria procera.** (*O. R.* 1914, 278.) Orchidaceae. S. Plant about 18 in. high. Leaves lanceolate-oblong, very undulate, produced on the lower part of the stem. Racemes 12–30-flowered. Flowers white, with the tips of the sepals and spur green. Lip 3-lobed; side-lobes filiform. Spur about 4 in. long, pendulous. A re-introduction; it was in cultivation in 1835. See *Bot. Reg.* t. 1858. West Tropical Africa. (Kew.)

Haberlea Austinii. (*G. C.* 1914, lv. 411.) Gesneraceae. H. This was formerly regarded as a variety of *H. Ferdinandi-Coburgii* to which it is apparently closely allied. It appears to be a free grower, and has lilac or violet and white flowers. (Cunningham, Fraser, & Co.)

***Hibiscus Waimeae.** (*B. M.* t. 8547.) Malvaceae. G. A tree up to 25ft. high. Leaves broadly elliptic-ovate or suborbicular, toothed, 3½–8 in. long, 3–7 in. broad; veins purplish. Flowers solitary in the upper axils. Bracts 6–8, linear-subulate, about ⅓ in. long. Corolla white; limb spreading; segments about 4½ in. long. Syn. *H. Arnottianus*, H. Mann. Hawaiian Islands. (Kew.)

Hippeastrum (Habranthus) Elwesii. (*K. B.* 1914, 330.) Amaryllidaceae. G. Leaves appearing with the flowers, linear, acuminate, concave, 10½ in. long, 2½ lin. broad. Peduncle cylindrical, 2-flowered. Perianth a clear yellow, blood-red inside the tube; tube funnel-shaped, scarcely 1½ in. long; lobes subspreading, elliptic, 1¾ in. long. Argentina. (H. J. Elwes.)

Huernia transvaalensis. (*K. B.* 1914, 249.) Asclepiadaceae. G. Resembles *H. guttata*, but the tube of the corolla is furnished inside with purple hairs, the lobes are dark purple, with yellow lines at the base, and the lobes of the interior corona are recurved at the apex. Transvaal. (Dep. Agric., Pretoria.)

***Hypericum laeve rubrum.** (*G. C.* 1914, lvi. 16.) Hypericaceae. H.? A free-flowering shrubby species, with sparingly leafy brown twiggy

stems about 1½ ft. high. Leaves linear, about 1 in. long. Flowers about ½ in. across, borne in dense corymbs, orange-red, with yellow stamens. Asia Minor. (Bees, Ltd.)

***Ilex pedunculosa,** var. **continentalis.** (*Bean, T. & S.* i. 649.) Aquifoliaceae. H. An evergreen shrub or tree up to 20 or 30 ft. high. Leaves unarmed, ovate or oval, entire, 4–5 in. long; petiole ½–¾ in. long. Fruits bright red, ¼ in. long, on pedicels 1–1½ in. long. It differs from the type, which was introduced from Japan in 1893 but is probably not now in cultivation, in its longer leaves and minutely ciliate calyx. Central China. (J. Veitch & Sons.)

***Inula acaulis.** (*G. C.* 1914, lvi. 246, f. 97.) Compositae. H. An almost stemless perennial herb, rarely more than 1 in. high, forming mats of small lanceolate-spathulate dark green leaves. Flower-heads golden, 1½–2 in. across. Asia Minor. (Miss E. Willmott.)

Ione flavescens. (*K. B.* 1914, 373.) Orchidaceae. S. Pseudobulbs depressed-ovoid, 5 lin. long, 1-leaved. Leaves linear-oblong, about 2 in. long. Peduncles lateral, short, 2-flowered. Flowers medium-sized. Sepals pale yellowish-green. Petals and lip deep yellow. Burma. (Glasnevin B. G.)

Iris Boissieri x tingitana. (*G. C.* 1914, lvi. 322.) Iridaceae. H. Garden hybrid. (W. R. Dykes.)

Iris chrysographes x Douglasiana. (*G. C.* 1914, lv. 364.) H. Garden hybrid. (W. R. Dykes.)

***Iris Urumovii.** (*G. C.* 1914, lvi. 272.) H. Closely allied to *I. Sintenisii* and *I. graminea*. From the former it differs in being very glaucous, in having a slender habit, leaves that die right away in winter, and non-keeled spathes. From the latter it may be distinguished by its glaucous character and its ovary, which has a long slender neck. Flowers pale purple to dark red-purple, with some white on the falls. Bulgaria. (W. R. Dykes; Hon. N. C. Rothschild.)

***Iris Watsoniana.** (*G. C.* 1914, lv. 391, f. 177.) H. Very similar to *I. tenax* and *I. Douglasiana*, differing from the former by having branching stems, a slightly longer perianth-tube, and more sharply 3-sided ovary, and from the latter by its non-persistent leaves, short perianth-tube, divergent spathes, as well as by other characters. The flowers are relatively large, of some shade of violet or lavender purple, usually with a suffusion of blue down the centre of standards and falls. California. (W. R. Dykes.)

***Ixora umbellata.** (*B. M.* t. 8577.) Rubiaceae. S. A large much branched free-flowering shrub. Leaves elliptic or oblong-elliptic, 6–10 in. long, 3–4½ in. broad. Flowers white, in terminal corymbs about 6 in. across. Calyx deeply lobed; lobes broadly ovate, ciliate. Corolla-tube slender, 1¼ in. long; lobes 4, oblanceolate-oblong, ⅓ in. long. Java. (Kew.)

***Juniperus pachyphloea stricta.** (*R. H.* 1914, 344.) Coniferae. H. A form with compact habit and bluish leaves. (Barbier & Co., Orleans.)

***Kniphofia carinata.** (*B. M.* t. 8545.) Liliaceae. H.H. A new species allied to *K. comosa*, from which it is distinguished by its much shorter yellow filaments. Leaves 2½ ft. long, 1 in. broad at the base, gradually tapering to an acuminate tip, thin, sharply keeled beneath. Raceme 6 in. long, densely flowered. Perianth clear yellow, ¾ in. long. South Africa. (Kew.)

***Kniphofia kewensis.** (*G. C.* 1914, lvi. 410.) H.H. The name given to the hybrid between *K. pauciflora* and *K. Macowanii*, which was described in *G. C.* 1893, xiv. 424. (Kew.)

***Kniphofia sparsa.** (*G. C.* 1914, lvi. 410.) H.H. A new name for the plant cultivated as *K. modesta* and figured in *B. M.* t. 7293. The true *K. modesta* is not nearly so stout a plant, and it is remarkable in having all its flowers directed to one side of the spike, while in *K. sparsa* they are rather loosely scattered, and are directed to all sides. Natal. (Kew.)

Laelia evershotensis. (*O. W.* iv. 112.) Orchidaceae. G. Garden hybrid between *L. xanthina* and *L. Iona*. (E. F. Clark.)

Laelio-cattleya ardens. (*R. H.* 1914, 334.) Orchidaceae. G. Garden hybrid between *Laelia Canhamiana* and *Cattleya Mossiae Quo Vadis*. (E. Bert, Bois-Colombes, Seine, France.)

Laelio-cattleya aurealis. (*O. W.* iv. 112.) G. Garden hybrid between *Laelia autumnalis* and *Cattleya aurea*. (F. Sander & Sons.)

Laelio-cattleya brugensis. (*G. C.* 1914, lvi. 15; *O. W.* iv. 252.) G. Garden hybrid between *L.-c. Martinetii* and *L.-c. luminosa*. (F. Sander & Sons.)

Laelio-cattleya Chamberlainiana. (*O. R.* 1914, 371.) G. Garden hybrid between *L.-c. Amelia* and *L.-c. elegans Turneri*. (A. Chamberlain.)

Laelio-cattleya corneliensis. (*G. C.* 1914, lv. 192, 247; *O. W.* iv. 164.) G. Garden hybrid between *L.-c. Haroldiana* and *Cattleya Schroederae*. (Earl of Craven.)

Laelio-cattleya giganceps. (*O. W.* iv. 187.) G. Garden hybrid between *Cattleya Warscewiczii* (*Gigas*) and *Laelia anceps*. (Th. Pauwels, Meirelbeke, Belgium.)

Laelio-cattleya jucunda. (*O. W.* iv. 188.) G. Garden hybrid between *Cattleya Perciviliana* and *L.-c. Edwardii*. (F. Sander & Sons.)

Laelio-cattleya labiosa. (*O. W.* iv. 164.) G. Garden hybrid between *Cattleya labiata* and *L.-c. luminosa*. (Cypher & Sons.)

Laelio-cattleya Mantiniosa. (*O. W.* iv. 92.) G. Garden hybrid between *Cattleya Mantinii* and *L.-c. luminosa*. (Th. Pauwels, Meirelbeke, Belgium.)

Laelio-cattleya primulina. (*J. H. F.* 1914, 86; *R. H.* 1914, 122.) G. Garden hybrid between *L.-c. Doris* and *Cattleya Gaskelliana*. (C. Maron & Son, Brunoy, Seine & Oise, France.) [This name has also been given to a hybrid between *L.-c. Hon. Mrs. Astor* and *Cattleya fulvescens*, raised by F. Sander & Sons. See *G. C.* 1914, lvi. 375.]

Laelio-cattleya Swanboroughii. (*O. R.* 1914, 37, 58.) G. Garden hybrid between *L.-c. Dominiana* and *L.-c. Andromeda*. (Mrs. Sheppee.)

Laelio-cattleya Tri-lobata. (*O. W.* iv. 187.) G. Garden hybrid between *Cattleya Trianae* and *Laelia lobata*. (E. F. Clark.)

Laelio-cattleya Wilfrediana. (*G. C.* 1914, lv. 51.) G. Garden hybrid between *L.-c. cinnabrosa* and *Cattleya Aclandiae*. (W. H. St. Quintin.)

***Larix Mastersiana.** (*Pl. Wils.* ii. 19.) Coniferae. H. A new species closely allied to *L. Griffithii* from which it may be distinguished by the papillose epidermis of the leaves, and by the smaller cones, which are $1\frac{1}{4}$–$1\frac{3}{4}$ in. long, with smaller bracts gradually, not abruptly, cuspidate at the apex. Western China. (Arnold Arboretum.)

Leucampyx Newberryi. (*G. C.* 1914, lv. 67.) Compositae. H. A perennial herb, 1–2 ft. high, woolly, glabrate when old. Leaves pinnately divided into very narrow segments. Flower-heads few or several. Involucre nearly $\frac{1}{2}$ in. across. Ray-florets $\frac{3}{4}$ in. long, at first yellow, soon changing to cream-colour or white. See *Gray, Syn. Fl. N. Amer.* i. pt. 2, ed. 2, 362. Colorado and New Mexico. (T. D. A. Cockerell, Boulder, Colorado, U.S.A.)

***Lindera megaphylla.** (*Bean, T. & S.* ii. 30.) Lauraceae. H. An evergreen shrub or tree. Leaves oblong to oblanceolate, entire, 4–9 in. long, 1–$2\frac{1}{4}$ in. broad, very glossy and dark green above, pale and glaucous beneath; petiole $\frac{1}{2}$–1 in. long. Flowers numerous, in shortly stalked axillary umbels. Central and Western China. (J. Veitch & Sons.)

Lithraea Gilliesii. (*R. H.* 1914, 200, f. 61.) Anacardiaceae. G. A small evergreen tree reaching about 10 ft. high, attractive on account of its reddish-brown young growths and glazed leaves. Branches often in whorls of 4. Leaves dark green, 3- or 5-foliolate; leaflets lanceolate. Inflorescences in the upper axils, few-flowered. Flowers small, yellowish-white. Fruits small. Brazil and Chili. (Tunis B. G.) [*L. Aroeirinha*, March.]

***Livistona decipiens.** (*B. T. C.* 1914, 13, t. 1.) Palmae. S. A new species which has been cultivated on the Riviera under the erroneous names of *Copernicia cerifera* and *Liristona inermis*. It is remarkable for the entangled appearance of its crown of leaves, which are very deeply divided into about 80 segments, the outer of which are very narrow; all are deeply bipartite, the ultimate segments having long-acuminate flaccid pendulous tips. The petiole has some small spines only at the base, and the spathe is glabrous. See *Martelli, Webbia*, iii. 295. Australia.

***Lonicera alseuosmoides.** (*Bean, T. & S.* ii. 39.) Caprifoliaceae. H. A pretty climbing evergreen shrub. Leaves narrowly oblong, $1\frac{1}{4}$–2 in. long, $\frac{1}{4}$–$\frac{1}{3}$ in. broad. Flowers at the apex of the shoots, forming a short

broad panicle. Corolla purple inside, yellow outside, funnel-shaped, ½ in. long. Fruit globose, black. Western China. (J. Veitch & Sons.)

***Lonicera Delavayi.** (*Bean, T. & S.* ii. 41.) H. A climber belonging to the same group as *L. japonica*. Leaves ovate-lanceolate, 2–5 in. long, ¾–2 in. broad, glabrous above, grey-felted beneath; petiole ⅛–¼ in. long. Flowers in axillary pairs at the end of the shoot, forming a kind of panicle, fragrant. Corolla pale yellow; tube slender, 2 in. long; limb 2-lipped, the larger lip ¾ in. long. Syn. *L. similis*, var. *Delavayi*, Rehd. Central and Western China. (M. L. de Vilmorin, Les Barres, France.)

Lonicera mupinensis. (*Pl. Wils.* i. 138; *G. C.* 1914, lv. 373.) H. Bush about 4 ft. high. Leaves variable in shape, often elliptic-oblong or oblong, 2½–5 in. long; petiole 2½–4 lin. long. Flowers 2 together on long peduncles, dark red, small. Western China. (Arnold Arboretum; Hon. Vicary Gibbs.)

***Lonicera trichosantha.** (*Bean, T. & S.* ii. 59.) H. A deciduous vigorous species forming a rounded dense leafy bush. Leaves oval to obovate, 1–2 in. long, ½–1¼ in. broad; petiole ⅛–¼ in. long. Flowers pale yellow, a deeper shade when fading. Corolla ½–¾ in. long, hairy outside. Berries red. Western China. (Arnold Arboretum.)

Lonicera yunnanensis, var. tenuis. (*Bean, T. & S.* ii. 59.) H. A low creeper, with slender glabrous stems. Leaves oblong or narrowly obovate, smaller than in the type in which they are 1½ 3 in. long and about ⅓ as broad; upper pair or pairs connate, bearing the sessile flowers in their axils. Corolla yellow, ¾–1 in. long. South-Western China. (J. Veitch & Sons.)

Lysionotus Willmottiae. (*G. C.* 1914. lvi. 17, 100.) Gesneraceae. G. A dwarf shrub with ovate-lanceolate leaves and lilac-blue flowers 1¾ in. long, resembling those of a *Pentstemon*. China. (Miss Willmott.)

Mammillaria conspicua. (*M. K.* 1912, 163; 1914, 37, f.) Cactaceae. G. Stem simple, cylindric - globose, nearly 6 in. high. Tubercles very much crowded, conical, about ¼ in. long; juice not milky. Areolae small, subelliptic, the younger sparingly woolly but soon naked. Radial spines 16–25, rigid, up to about ¼ in. long; central spines 2, up to 5 lin. long, somewhat curved. Flowers unknown. Fruits cylindric-clubshaped, carmine - red. Mexico (Darmstadt B.G.)

Mammillaria Cürkeana. (*M. K.* 1914, 52, f.) G. Stem simple, depressed-globose, about 2½ in. high and 3⅓ in. broad, pale to dark green. Tubercles thick, rounded at the apex, about ⅔ in. long and ¾ in. broad. Radial spines 7, subulate, straight, strong, up to ⅔ in. long, 3 or 4 much more slender than the others; central spines 2 or 3, very thick, ⅔–¾ in. long. Flowers unknown. Mexico. (F. De Laet, Contich, near Antwerp.)

Masdevallia curtipes. (*G. C.* 1914, lvi. 143; *O. R.* 1914, 237.) Orchidaceae. G. A near ally of *M. infracta*, differing in having very short scapes which are only about a third as long as the leaves. It is a free-flowering pretty species with a rosy purple perianth, yellowish at the tips of the segments. Brazil. (F. Sander & Sons.)

***Mazus reptans.** (*B. M.* t. 8554.) Scrophulariaceae. H. A new species which was exhibited in 1913 under the name of *M. rugosus* (*G. C.* 1913, liii. 158, 190, 210, f. 94), from which it is quite distinct. It is a tufted perennial herb 1–2 in. high, with prostrate stems which root at the nodes. Leaves lanceolate, ⅔–1 in. long, including the petiole, few-toothed. Racemes erect, 1¾–2 in. long, few-flowered. Corolla unequally 2-lipped, about ¾ in. long, purplish-blue, blotched with white, yellow and red-purple on the lower lip. Himalaya. (Wargrave Plant Farm.)

***Meconopsis rudis.** (*B. M.* t. 8568.) Papaveraceae. H. A monocarpic herb with a simple scapose prickly stem 1¼–3 ft. high. It is closely allied to *M. aculeata*, but differs in having entire or nearly entire leaves and flowers with always more than 4 petals. Western China. (Arnold Arboretum; Kew.)

***Meliosma Beaniana.** (*Pl. Wils.* ii. 206.) Sabiaceae. H. Differs from all the other species of the genus in having the flowers in axillary instead of terminal panicles. It is a very handsome tree with pinnate leaves 6–14 in. long and small precocious white flowers. Central and Western China. (Arnold Arboretum.)

***Mesembryanthemum fulviceps.** (*K. B.* 1914. 167.) Ficoideae. G. Plant-bodies obconical, truncate, 1–2 in.

long, about 1 in. across at the apex, marked with small rounded dark green spots. Leaves 2, united beyond the middle. Flowers unknown. Great Namaqualand. (Kew.)

***Metrosideros lucida.** (*G. C.* 1914, lv. 450, f. 206; lvi. 31.) Mytraceae. H. or H.H. A tree 30-60 ft. high or sometimes a shrub. Leaves lanceolate or narrowly oval, acute, 2–3½ in. long, shining green, gland-dotted. Flowers several together at the ends of the branches, attractive owing to their numerous crimson stamens which are up to 1 in. long. (L. Messel, &c.)

Miltonia vexillaria illustris. (*G. C.* 1914, lvi. 15; *G. M.* 1914, 574.) Orchidaceae. S. Flowers rather large. Sepals and petals rose-pink. Lip white with a red blotch at the base and faint red veins. (F. Sander & Sons.)

***Morus cathayana.** (*Bean, T. & S.* ii. 85.) Urticaceae. H. Tree 10–20 ft. high. Leaves cordate, 3–6 in. long in adult plants, roundish-toothed or often 3-lobed, hispid above, softly hairy beneath; petiole about 1 in. long. Male spikes ¾ in. long, on a slender peduncle about as long. Female spikes similar in length but more densely flowered. Central China. (Arnold Arboretum.)

Nicotiana plumbaginifolia hybrida. (*Jard.* 1914. 140.) Solanaceae. G. or H.H. Garden hybrid between *N. plumbaginifolia* and *N. affinis hybrida.* (Dammann & Co., Naples.)

Nyssa sinensis. (*Bean, T. & S.* ii. 103.) Cornaceae. H. A deciduous tree 20–40 ft. high. Leaves narrowly oval, tapering at apex and base, 4–6 in. long, 1½–2 in. broad; petiole ¼ in. long. Flowers unattractive, the male in a rounded head ½ in. across, on a slender stalk 1–1½ in. long, the females few, on longer stalks. Fruit oblong, ½ in. long, bluish. Central China. (J. Veitch & Sons.)

Odontioda Ashtonii. (*G. C.* 1914, lv. 442; *O. R.* 1914, 216.) Orchidaceae. G. Garden hybrid between *Odontoglossum Armstrongiae* and *Cochlioda Noetzliana.* (E. R. Ashton.)

Odontioda Colmanii. (*G. C.* 1914, lv. 226; *O. R.* 1914, 125.) G. Garden hybrid between *O. Bradshawiae* and *Odontoglossum amabile.* (Sir J. Colman.)

Odontioda crispilia. (*G. C.* 1914, lvi. 226; *O. W.* v. 15.) G. Garden hybrid between *O. Cecilia* and *Odontoglossum crispum.* (R. G. Thwaites.)

Odontioda delicata. (*G. C.* 1914, lv. 410.) G. Garden hybrid between *Odontioda St. Fuscien* and *Odontoglossum ardentissimum.* (F. Sander & Sons.)

Odontioda Fowleriana. (*O. W.* iv. 208.) G. Garden hybrid between *O. Bradshawiae* and *Odontoglossum percultum.* (J. Gurney Fowler.)

Odontioda fuscimium. (*O. R.* 1914, 125.) G. Garden hybrid between *O. St. Fuscien* and *Odontoglossum eximium.* (R. G. Thwaites.)

Odontioda Gratrixiae. (*O. R.* 1914, 190; *O. W.* iv. 187.) G. Garden hybrid between *O. Charlesworthii* and *Odontoglossum amabile.* (S. Gratrix.)

Odontioda illustris. (*G. C.* 1914, lv. 192.) G. Garden hybrid of unknown parentage. (Pantia Ralli.)

Odontioda rubens. (*O. W.* iv. 208.) G. Garden hybrid between *O. Charlesworthii* and *Odontoglossum eximium.* (J. Gurney Fowler.)

***Odontioda Thompsoniae.** (*G. C.* 1914, lv. 98; *O. R.* 1914, 56, 61.) G. Possibly a form of *O. Vuylstekeae* or a hybrid derived from it. (W. Thompson.)

Odontocidium southgatense. (*G. C.* 1914, lv. 154.) Orchidaceae. G. Garden hybrid between *Odontoglossum Edwardii* and *Oncidium macranthum.* (Hassall & Co.)

Odontoglossum amandens. (*O. W.* iv. 139.) Orchidaceae. G. Garden hybrid between *O. Wilckeanum* and *O. Rolfeae.* (J. & A. McBean.)

Odontoglossum amaranthum. (*G. C.* 1914, lv. 98; *O. R.* 1914, 61.) G. Garden hybrid of unrecorded parentage. (W. Thompson.)

Odontoglossum aurosum. (*O. R.* 1914, 95; *O. W.* iv. 138.) G. Garden hybrid between *O. cirrhosum* and *O. excellens.* (H. Dixon.)

Odontoglossum chryseum. (*O. W.* iv. 138.) G. Garden hybrid between *O. nobile* and *O. excellens.* (F. Sander & Sons.)

Odontoglossum crispum hololeucum. (*G. C.* 1914, lvi. 376.) G. Flower large, round, with a yellow blotch on the lip. (W. Thompson.)

Odontoglossum fulgidum. (*G. C.* 1914, lv. 31; *O. R.* 1914, 27.) G. Garden hybrid of unknown parentage, "but showing the influence of *O. Harryanum*." (W. Thompson.)

Odontoglossum igneum. (*O. R.* 1914, 58.) G. Garden hybrid between *O. cirrhosum* and *O. Wilckeanum*. (F. Sander & Sons.)

Odontoglossum jucundum. (*O. W.* iv. 208.) G. Garden hybrid between *O. crispum* and *O. McNabianum*. (F. Sander & Sons.)

Odontoglossum Lakinae. (*G. C.* 1913, liv. 317; 1914, lv. 311, f. 136.) G. Garden hybrid of unknown parentage. (E. H. Davidson.)

Odontoglossum Marnixii. (*J. H. F.* 1914, 384.) G. Garden hybrid between *O. cirrho-Edwardii* and *O. Hunnewellianum*, or according to *R. H.* 1914, 334, between *O. Hunnewelliano-crispum* and *O. crispum Cooksoniae*. (M. Nicolas, Précy-sur-Oise, France.)

Odontoglossum nebulum. (*O. R.* 1914, 187.) G. Garden hybrid between *O. nebulosum album* and *O. aspersum*. (W. Thompson.)

Odontoglossum Newlingii. (*G. C.* 1914, lv. 226; *O. R.* 1914, 125.) G. Garden hybrid between *O. Ossulstonii* and *O. cirrhosum*. (R. G. Thwaites.)

Odontoglossum purpuratum. (*G. C.* 1914, lv. 31; *O. R.* 1914, 28.) G. Garden hybrid of unrecorded parentage, but the lip of the flower shows traces of *O. Harryanum*. (W. Thompson.)

Odontoglossum Rickardsiae. (*G. C.* 1914, lvi. 404.) G. Garden hybrid between *O. Rossii* and *O. percultum*. (R. Windsor Rickards.)

Odontoglossum rubens. (*G. C.* 1914, lv. 31.) G. Garden hybrid of unrecorded parentage. (W. Thompson.)

Odontoglossum sandhurstianum. (*G. C.* 1914, lv. 77, f. 38; *O. R.* 1914, 59.) G. Garden hybrid between *O. coronarium* and *O. Edwardii*. (Armstrong & Brown.) [Syn. *O. sandhurstiense*; O. W. iv. 139.]

Odontoglossum Troyanowskiae. (*O. W.* iv. 252.) G. Garden hybrid between *O. Thompsonianum* and *O. Rolfeae*. (F. Sander & Sons.)

Odontoglossum Uroanthum. (*G. C.* 1914, lvi. 60; *O. W.* iv. 252.) G. Garden hybrid between *O. Kejeljanii* and *O. Uroskinneri*. (F. Menteith Ogilvie.)

Odontoglossum Uroexcellens. (*G. C.* 1914, lvi. 246; *O. R.* 1914, 351.) G. Garden hybrid between *O. Uroskinneri* and *O. excellens*. (R. Ashworth).

Odontonia Charlesworthii. (*G. C.* 1914, lvi. 107, f. 45; *O. R.* 1914, 241, f. 28.) Orchidaceae. G. Garden hybrid between *Odontoglossum Uroskinneri* and *Miltonia vexillaria*. (Charlesworth & Co.)

Odontonia Luciliae. (*G. C.* 1914, lv 137; *O. R.* 1914, 127.) G. Garden hybrid between *Odontoglossum cirrhosum* and *Miltonia spectabilis Moreliana*. (Charlesworth & Co.)

***Oenothera Hewettiana.** (*G. C.* 1914, lv. 84.) Onagraceae. H. A new species belonging to the same group as *O. Lamarckiana*. It has large yellow flowers the buds of which are as red as in *O. rubrinervis*. New Mexico. (T. D. A. Cockerell, Boulder, Colorado, U.S.A.)

***Olearia odorata.** (*Bean, T. & S.* ii. 106.) Compositae. H. A shrub with slender wiry little-branched terete stems. Leaves opposite, linear or spathulate, ¾-1½ in. long, ⅛–¼ in. broad, bright green above, covered with white hairs beneath. Flowerheads ¼ in. across, fragrant, dull greyish-brown. Introduced a few years ago as *O. virgata*. New Zealand.

Oncidioda Mauricii. (*G. C.* 1914, lv. 321, 326, f. 143; *R. H.* 1914, 243.) Orchidaceae. G. Garden hybrid between *Oncidium tigrinum* and *Cochlioda vulcanica*. (H. Graire, Amiens, France.)

Oncidium Engelii. (*O. R.* 1914, 47.) Orchidaceae. G. A distinct and attractive plant with a trailing inflorescence of white and brown flowers, which are larger and more compactly arranged than in *O. zebrinum*, with which the species has been confused. Venezuela. (Charlesworth & Co.)

Oncidium Leiboldii. (*O. R.* 1914, 361, f. 45.) G. A species with more or less equitant leaves and fragrant flowers, allied to *O. velutinum*, but much smaller. Cuba. (F. J. Le Moyne, Baltimore, Maryland, U.S.A.)

Oncidium Ottonis. (*Orchis*, 1914, 57, f. 11.) G. A new species very closely allied to *O. concolor*, but it has smaller and shorter pseudobulbs, the leaves are dark green instead of pale green, the flowers are somewhat larger, the sepals are marked with elongated blotches of brown-red or brown-purple near the distinctly undulate margin, and the lip is much more undulate and has a longer claw. South Brazil. (O. Beyrodt, Marienfelde, Berlin.)

Oncidium patulum. (*Orchis*, 1914, 18, col. t.) G. Described as a new species of the section *Miltoniastrum*, and allied to *O. Cavendishianum*, its flowers being similar in colour but smaller. The inflorescence is spreading, 5–7 in. long, paniculate, 20-30-flowered. Flowers fleshy, about 1 in. across. Probably Brazil. (Dahlem B. G.) [*O. nanum*, Lindl.; O. R. 1915, 39.]

Oncidium raniferum, var. **Binoti.** (*B. M. H. N.* 1913, 532.) G. Distinguished from the type by the smaller not emarginate lip. Brazil. (Paris B. G.)

***Osteomeles Schwerinae.** (*Bean, T. & S.* ii. 113, f.) Rosaceae. H. This is the plant figured in *B. M.* t. 7354 as *O. anthyllidifolia*, from the typical form of which it differs in its smooth fruit, less hairy calyx-lobes, and usually narrower leaves. Western China. (Paris B. G.; Kew.)

***Osteomeles subrotunda.** (*Bean, T. & S.* ii. 114.) H. Distinguished from *O. Schwerinae* by its stunted branches, slow growth, and smaller obovate leaflets. Japan. (Paris B. G.; Kew.)

Othonna pachypoda. (*G. C.* 1914, lvi. 27, f. 14.) Compositae. G. A new species remarkable for its short stout stem and slender trailing branches, the latter having a smooth pale brown bark. Leaves linear-spathulate or linear-oblanceolate, $1\frac{1}{4}$–$2\frac{1}{2}$ in. long, 2–4 lin. broad. Flower-heads 2 or 3 together, yellow, with usually 5 ray-florets and about 15 disc-florets. South-West Africa. (Cambridge B. G.)

***Pachysandra axillaris.** (*Bean, T. & S.* ii. 118.) Euphorbiaceae. H. An evergreen semi-woody plant. Stems 4–10 in. high. Leaves 3-6 near the apex of each stem, ovate, coarsely toothed in the upper part, 2–4 in. long, $1\frac{1}{4}$–$2\frac{1}{4}$ in. broad. Flowers white, borne in erect axillary spikes $\frac{3}{4}$–1 in. long. South-West China. (J. Veitch & Sons.)

Papaver orientale x somniferum. (*G. C.* 1914, lvi. 208.) Papaveraceae. H. Garden hybrid. (A. Perry.)

***Pelargonium transvaalense.** (*G. C.* 1914, lv. 102, f. 47.) Geraniaceae. G. A pretty species with a knotty or gnarled rootstock and herbaceous stems about 2 ft. high, covered, as well as the leaves, with short more or less glandular hairs. Leaves few, 3–5-angled, the largest 7 in. across; petiole up to 10 in. long. Peduncles 6–9 in. long. Umbels few-flowered. Pedicels $\frac{1}{8}$–$\frac{3}{8}$ in. long. Flowers pale pink, $1\frac{1}{2}$ in. across. Transvaal. (Cambridge B. G., where it was provisionally named *P. Thorncroftii*.)

***Pentstemon isophyllus.** (*Haage & Schmidt, Cat.* 1914, 197, f.) Scrophulariaceae. H.H. Plant $2\frac{1}{4}$–$2\frac{3}{4}$ ft. high, with long erect inflorescences of beautiful carmine-red flowers striped with white inside. Mexico. (Haage & Schmidt, Erfürt.)

***Phellodendron chinense.** (*Bean, T. & S.* ii. 131.) Rutaceae. H. Allied to *P. japonicum*, but the leaflets are longer, more oblong-lanceolate, and the fruit-clusters are only 1–2 in. broad and 2–$3\frac{1}{2}$ in. long, and are nearly sessile. Central China. (J. Veitch & Sons.)

***Philadelphus incanus.** (*Bean, T. & S.* ii. 135, f.) Saxifragaceae. H. Shrub up to 6 ft. high or more. Leaves ovate or oval, finely toothed, $2\frac{1}{2}$–4 in. long, $1\frac{1}{4}$–$2\frac{1}{4}$ in. broad, much smaller on the flowering twigs; petiole up to $\frac{1}{2}$ in. long. Flowers white, fragrant, about 1 in. across, opening in the later half of July. Central China. (J. Veitch & Sons.)

***Photinia Davidsoniae.** (*Pl. Wils.* i. 185; *Bean, T. & S.* ii. 144.) Rosaceae. H. A very handsome evergreen tree, most closely allied to *P. serrulata*, but distinguished by its shorter petioles, downy inflorescence, and smaller flowers and fruit. Central China. (J. Veitch & Sons.)

Pieris Forrestii. (*N. B. G. Edinb.* viii. 196.) Ericaceae. H. A very graceful shrub differing from *P. formosa* in several minor characters. It has a much more pendent habit; the leaves are often peculiarly reflexed along the branches; the pedicels are slenderer, with narrower bracts; the sepals are whitish, and the corolla is different in shape. Syn. *Gaultheria Forrestii*, Hort., not of Diels. South-Western China. (Bees, Ltd.; Edinburgh B. G.)

***Pileostegia viburnoides.** (*G. C.* 1914, lvi. 225, 238, f. 95; *G. M.* 1914, 724.) Saxifragaceae. H. A shrub somewhat resembling *Skimmia japonica*, with an inflorescence like that of an *Aralia*. Leaves obovate-oblong, about 2½ in. long, acuminate, entire, coriaceous. Flowers small, white, globose in the bud stage. The corolla is pushed off as a little cap by the stamens, which are the most conspicuous part of the flower. Khasia Mountains. China, Japan, Formosa. (Hon. Vicary Gibbs.)

***Pinguicula Reutheriana.** (*G. C.* 1914, lv. 364; *G. M.* 1914, 434.) Lentibulariaceae. H. A diminutive plant, only 3 in. high when in flower. Leaves oval, about 1½ in. long and ¾ in. broad, slightly incurved along the margin, arranged in a rosette. Flowering-stems erect. Flowers solitary, pale rose-pink with deeper pink lines and a violet-rose spur. Alps of Dauphiné. (G. Reuthe.)

***Pinus pumila.** (*Bean, T. & S.* ii. 176.) Coniferae. H. A close ally of *P. Cembra*. It is a dwarf mostly prostrate shrub, never more than 10 ft. high. Leaves in fives, 1½–2 in. long, usually entire on the margins. Cones 1½ in. long, orange-brown, never opening. A re-introduction. Eastern Asia. (H. Clinton Baker.)

***Pinus yunnanensis.** (*Bean, T. & S.* ii. 193.) H. ? A tree 100 ft. high in the wild state. Leaves in twos or in threes, 6–9 in. long, slender, much twisted in young specimens, toothed on the margins, finely pointed. Cones shortly stalked, 4–5 in. long, 2–3 in. broad before expanding, brown. Western China and Eastern Tibet. (Arnold Arboretum.)

Pirocydonia. (*R. H.* 1914, 27, ff. 6–8.) Rosaceae. H. *P. Danieli* and *P. Winkleri* are two forms of a graft hybrid obtained by grafting Williams' Bon Chrétien pear on the common quince. (St. Vincent College Gardens, Rennes, France.)

***Pittosporum pauciflorum.** (*Bean, T. & S.* ii. 197.) Pittosporaceae. H. An evergreen shrub 4–6 ft. high. Leaves in a cluster at the ends of the shoots, obovate to oblanceolate, entire, 3–5 in. long, ¾–1½ in. broad; petiole ½ in. long or less. Flowers fragrant, dull yellow, ⅓–½ in. long, axillary, solitary or a few together in racemes. Central China. (Kew.)

***Platanus racemosa.** (*Bean, T. & S.* ii. 203.) Platanaceae. H. ? A tree 40–100 ft. high in the wild state. Leaves usually 5- sometimes 3-lobed, slightly cordate at the base, 6–12 in. broad and rather more in length, thickly clothed beneath, especially along the midrib and veins, with a pale persistent down; lobes reaching half-way to the midrib or more, pointed, shallowly often distantly toothed; petiole stout, 1–3 in. long. Flower-heads globose, 2–7 on a pendulous peduncle. California. (F. R. S. Balfour.)

Platycerium Cordreyi. (*G. C.* 1914, lv. 363; *G. M.* 1914, 434.) Filices. S. Garden hybrid between *P. Veitchii* and *P. alcicorne*. (H. B. May & Sons.)

***Pleione pogonioides.** (*B. M.* t. 8588; *O. R.* 1914, 108.) Orchidaceae. G. A terrestrial herb 3–4 in. high. Pseudobulbs ovoid, ½–⅔ in. long, 1-leaved. Leaves elliptic-lanceolate, 2–6½ in. long, ¾–1½ in. broad. Flower terminal, showy, rosy red with a whitish disc; segments 1⅓–1½ in. long. Central China. (Charlesworth & Co.)

***Pleurothallis Lankesteri.** (*K. B.* 1914, 210.) Orchidaceae. G. Differs from the closely allied *P. myriantha*, which it resembles in habit, by the shape and colour of the lip. Flowers minute, borne in fascicles below the leaves, deep yellow, with the obovate-oblong lip and the column dark purple. Costa Rica. (Kew.)

***Poinsettia pulcherrima rosea.** (*G. C.* 1914, lvi. 190, col. t.) Euphorbiaceae. G. Bracts rosy pink. (H. B. May & Sons.) [*Euphorbia pulcherrima*, var.]

Poinsettia pulcherrima Trebsti. (*M. G. Z.* 1914, 19; *J. of H.* 1914, lxviii. 397.) G. A sport from the variety *alba*. Bracts delicate salmon-pink, the lowest somewhat shaded with green. (A. Trebst, Merseburg, Germany.) [*Euphorbia pulcherrima*, var.]

***Polystachya Hislopii.** (*K. B.* 1914, 375.) Orchidaceae. S. An epiphytic herb. Pseudobulbs tufted, ovoid-oblong or fusiform-oblong, 1¼–1¾ in. long, 3-4-leaved. Leaves lanceolate-oblong, 2½–5 in. long. Peduncles terminal, about 5 in. long, few-flowered. Sepals and petals light emerald-green, the former 5–6 lin. long and the latter 4 lin. long. Lip 3-lobed, 4 lin. long, white with a rose-coloured margin and a few rose-coloured veins and pale purple spots. Rhodesia. (Kew.)

Polystichum munitum undulatum. (*G. C.* 1914, lv. 442.) Filices. H.

Fronds more shining than in the type and the pinnae in the upper two-thirds of their length are so undulate as to form spirals. British Columbia. (J. Fraser, Uchulet, British Columbia; C. T. Druery.)

***Populus generosa.** (*G. C.* 1914, lvi. 257, ff. 102-103.) Salicaceae. Garden hybrid between *P. angulata* and *P. trichocarpa.* (Glasnevin B. G.)

Populus Henryana. (*G. C.* 1914, lvi. 47. f. 17.) H. A hybrid of unknown origin. It has a branching habit similar to that of *P. monilifera.* Only the male form is known, and of this there is a fine specimen 100 ft. high at White Knights, Reading. See *Elwes & Henry, Trees,* vii. 1829.

Populus Lloydii. (*G. C.* 1914. lvi. 66, f. 27.) H. A hybrid of which the parents are probably *P. nigra,* var. *betulifolia* and *P. serotina.* See *Elwes & Henry, Trees,* vii. 1830. (Major Lloyd.)

Potentilla Forrestii. (*N. B. G. Edinb.* viii. 198.) Rosaceae. H. Very closely allied to *P. nivea,* but it is a larger plant with the leaves grey-tomentose beneath, deeply trifid obovate calycine bracts, and mature achenes shorter than the style. Flowers yellow. Almost certainly from Yunnan, China. (Edinburgh B. G.)

***Potentilla Purdomii.** (*K. B.* 1914, 184.) H. A very distinct new species characterised by the pinnate leaves being green on both sides, by the very broadly sessile leaflets, by the carpels being pilose only at the apex, and by the filiform style. It is a herb up to 12 in. high, with yellow flowers about ⅔ in. across. North China. (J. Veitch & Sons.)

***Primula bellidifolia.** (*Gard.* 1914, 399.) Primulaceae. H. Probably only a large form of *P. farinosa.* It has bluish-purple flowers in good-sized heads. Himalaya. (J. Mac-Watt.)

Primula Clementinae. (*Gard.* 1914. 93.) H. Plant more or less covered with farina. Scape slender, considerably longer than the leaves, bearing an umbel of several lilac flowers. Western China. (Bees, Ltd.) [= *P. kichanensis,* Franch.]

Primula coerulea. (*N. B. G. Edinb.* iv. 221, t. 34; *J. R. H. S.* xxxix. 147.) H. Plant 2–3 in. high. Leaves petiolate, ovate or ovate-elliptic, 1¾–4½ in. long. Scape 2–3 in. high, more or less woolly, 1– or sometimes 2–flowered. Corolla rich purplish-blue, with the eye and tube yellowish-green; limb 1–1¼ in. across. Yunnan, China. (Bees, Ltd.)

***Primula denticulata superba.** (*G. C.* 1914, lv. 291.) H. "A greatly improved variety, which is more floriferous and more richly coloured than the type." (Cocker & Sons.)

***Primula dryadifolia.** (*G. C.* 1914, lv. 364; *N. B. G. Edinb.* vii. 37.) H. Plant 1–2½ in. high. Leaves petiolate, broadly ovate, crenate, 3½–4½ lin. long, 2½–3 lin. broad, densely farinose beneath. Scape thick, 1–3-flowered. Flowers bright rose-red, non-fragrant. Corolla-tube narrowly funnel-shaped, scarcely longer than the calyx; limb up to 1⅓ in. across. South-West China and South-East Tibet. (Edinburgh B. G.) [Syn. *P. congestifolia,* Forrest in *N. B. G. Edinb.* iv. 226, t. 28A.]

***Primula elongata.** (*Gard.* 1914, 400.) H. Resembles *P. sikkimensis* in its smooth leaves, but it differs in the elongated corolla-tube. Corolla yellow, very delicate; lobes smooth and veined. Himalaya. (J. Mac-Watt.)

***Primula Giraldiana.** (*J. R. H. S.* xxxix. 152, f. 54.) H. The correct name of the plant included in the list of 1907 as *P. muscarioides.*

Primula helodoxa. (*J. of H.* 1914, lxviii. 103; *Gard.* 1914, 119.) H. "Bears handsome whorls of deep yellow flowers in tiers one above another." South-West China? (J. C. Williams.)

***Primula heucherifolia.** (*J. R. H. S.* xxxix. 144.) H. The correct name of the plant included in the list of 1911 as *P. Gagnepainii.*

Primula kichanensis. See **P. Clementinae.**

Primula malacoides rosea. (*Haage & Schmidt, Cat.* 1914, 197.) G. Flowers rose-coloured. (Haage & Schmidt.)

Primula microdonta. (*J. R. H. S.* xxxix, 159.) H. Very similar to *P. sikkimensis,* but easily distinguished by the suborbicular-ovate irregularly toothed leaves, which are glabrescent and have a petiole as long as the limb. The corolla is at least twice as large as the calyx, and is deep

yellow, elegantly veined. See *Bulletin de l'Herbier Boissier*, 2me sér. vii. 526, f. Western China. (Bees, Ltd.)

***Primula modesta.** (*J. R. H. S.* xxxix. 176, f. 85; *Gard.* 1914, 280.) H. Closely allied to *P. farinosa*, of which it may be a subspecies. It has a golden instead of silvery farina, and the flowers are purplish. Japan. (Edinburgh B. G.)

Primula nessensis. (*Gard.* 1914, 119.) H. Another name for the plant distributed as *P. farinosa Beesii* and *P. pseudodenticulata*. (Bees, Ltd.)

Primula oblanceolata. (*G. C.* 1914, lvi. 142.) H. A new species which, with two others, has been called *P. angustidens*. It is closely allied to *P. Poissonii*, and is characterised as follows:—Plant not aromatic. Leaves long, narrow, flat. Corolla-tube white; limb flat. China. (Bees, Ltd.)

Primula oculata. (*J. R. H. S.* xxxix. 144.) H. Belongs to the section *Geranioides*, and is allied to *P. septemloba*. It has *Geranium*-like leaves and red-purple drooping flowers, darker than in other Chinese species of the section. Western China. (J. Veitch & Sons; introduced in 1904, but probably not now in cultivation.)

Primula pseudomalacoides. (*J. R. H. S.* xxxix. 149.) G. Very similar to *P. malacoides*, but it is in every way a more delicate plant, and does not readily seed unless cross-pollinated. Yunnan, China. (Bees, Ltd.)

***Primula pseudosikkimensis.** (*J. R. H. S.* xxxix. 159, f. 64.) G. Differs from *P. sikkimensis* in its shorter leaves and larger flowers. Yunnan, China. (Bees, Ltd.)

***Primula redolens.** (*G. C.* 1914, lv. 224.) H. A species of the section *Suffruticosae*, resembling *P. Forrestii* in foliage, but this in *P. redolens* is softer and more hairy. Scape stout, 6-9 in. high. Umbel 12-20, flowered. Flowers white to pale pink, sometimes splashed with purple, all with a small yellow eye. Western China. (Bees, Ltd.; Edinburgh B. G.)

Primula septemloba. (*J. R. H. S.* xxxix. 144, f. 46; *Gard.* 1914, 119.) H. Belongs to the section *Geranioides*. It is a graceful plant with leaves lobed like those of a *Geranium*, and red-purple drooping flowers in an umbel borne on a scape much longer than the leaves. Western China. (Bees, Ltd.)

***Primula sinolisteri.** (*J. R. H. S.* xxxix. 142, f. 45; *Gard.* 1914, 119.) G. A microform of *P. obconica*, but it has not the irritant hairs of that species. It is a free-grower, forming compact masses of dark green acutely lobed leaves, and produces many umbels of white or sometimes lilac flowers. It has been distributed as *P. Listeri*, from which it is distinct. Yunnan, China. (Bees, Ltd.)

Primula sinomollis. (*J. R. H. S.* xxxix. 145, f. 48.) G. A species of the *Mollis* section. It has petiolate grey-hairy rounded leaves and long scapes bearing superposed whorls of red flowers. Calyx cup-shaped to campanulate, ribbed, with straight erect lobes. Yunnan, China. (J. C. Williams.)

Primula sphaerocephala. (*Gard.* 1914, 93.) H. Similar to *P. capitata*, having small globular heads of purple-blue flowers. South-West China. (Edinburgh B. G.)

***Primula umbrella.** (*J. R. H. S.* xxxix. 164, f. 72.) H. Resembles *P. Clementinae* (*P. kichanensis*) in many points, but has a shorter scape and a calyx with long sharp lobes. The plant is farinose, and produces an umbel of 5 or 6 lilac-purple flowers. Yunnan, China. (Bees, Ltd.)

***Prunus Conradinae.** (*Pl. Wils.* i. 211, 233; *G. C.* 1914, lv. 345.) Rosaceae. H. A new species of the section *Pseudocerasus*. It forms a graceful tree, with rather thin shoots and large leaves. The branches of the current year and the petioles are glabrous. Flowers pink. Petals about ½ in. long, emarginate-bilobed. Style glabrous. Central China. (Arnold Arboretum; Hon. Vicary Gibbs.)

***Prunus microlepis,** var. **Smithii.** (*K. B.* 1914, 51.) H. This has been in cultivation during the last 3 or 4 years under the erroneous name of *P. Miqueliana*. It is a small deciduous tree, with ovate to ovate-lanceolate serrate leaves, 1½–3½ in. long, and pale pink flowers, 1 in. across, remarkable in having 10–15 petals. Japan. (T. Smith, Newry.)

Prunus pilosiuscula, var. **media.** (*Pl. Wils.* i. 204; *G. C.* 1914, lv. 345.) H. A free-flowering shrub or tree. Leaves obovate or obovate-oblong, 2–3½ in. long, ¾-1¾ in. broad, acuminate, sharply toothed. Petiole

¼–½ in. long. Flowers solitary or 2 or 3 together, appearing with the leaves, pink. Petals oval, 4½ lin. long. It differs from the type in the hairs on the midrib and nerves of the underside of the leaves. Central China. (Arnold Arboretum; Hon. Vicary Gibbs.)

Pteris flabellata plumosa. (*G. C.* 1914, lv. 363; *G. M.* 1914, 434.) Filices. S. A form in which the fronds are often beautifully plumose. (H. B. May & Sons.)

***Pyrus Meinichii.** (*Bean, T. & S.* ii. 277.) Rosaceae. H. Intermediate between *P. Aucuparia* and *P. pinnatifida*, and probably a seedling from the latter. Introduced about 1904. Norway. (Earl of Ducie.)

***Quercus Schneckii.** (*Bean, T. & S.* ii. 324). Cupuliferae. H. A deciduous species sometimes reaching a height of 200 ft. Leaves 6–8 in. long, obovate, 5- or 7-lobed, dark glossy green and glabrous above, at first covered beneath with loose stellate hairs, afterwards glabrous except for tufts of hairs in the vein-axils. Acorns ovoid, up to 1 in. long. Southern and Central United States. Syn. *Q. texana*, Sargent, not Buckley. (Kew.)

Quercus semecarpifolia. (*J. R. H. S.* xl. 78, f. 26.) H. A tree sometimes reaching 160 ft. high. Leaves almost sessile, usually elliptic, prickly-toothed, often about 3 in. long and 2 in. broad, lasting till a month or two before the new ones appear. Acorns solitary or in pairs, ripening in the second year. Cupule hemispherical, about ½ in. across, covered with closely appressed tomentose scales. Himalaya and Western China. (J. S. Gamble.)

Quercus vaccinifolia. (*Bean, T. & S.* ii. 366.) H. Closely allied to *Q. chrysolepis*, of which it is sometimes regarded as a variety. A shrub up to 4 ft. high, with small oval mostly entire leaves, covered beneath with a pale grey scurf. Introduced in 1909. Oregon and California.

Renanthera pulchella. (*K. B.* 1914, 213; *G. M.* 1914, 574.) Orchidaceae. S. A new species with a general resemblance to *R. Imschootiana*, but its flowers are only about half the size and are different in structure. They are yellow, with the side lobes of the lip and the upper half of the petals crimson. Burma. (A. A. Peeters & Co., Brussels.)

Rhododendron Barclayi. (*G. C.* 1914, lv. 191.) Ericaceae. H. Garden hybrid between *R. Aucklandii* and *R. Thomsonii*. (R. Fox.)

Rhododendron burmanicum. (*K. B.* 1914, 185.) G. Distinguished from *R. formosum* by the leaves being very densely scaly on the upper side. Leaves oblanceolate or subobovate-oblanceolate, 2½–3⅓ in. long, up to 1¼ in. broad. Flowers terminal, 5 or 6 together, greenish-white, very sweet-scented. Mount Victoria, Burma. (Glasnevin B. G.)

***Rhododendron crassum.** (*K. B.* 1914, 201.) H.? Very closely allied to *R. Maddeni*, differing from the typical form of that species by its larger calyx-lobes. Its flowers are creamy white to rosy white, funnel-shaped, 3 in. long, 4 to 7 together in a terminal cluster. South-Western China. (Bees, Ltd.)

***Rhododendron discolor.** (*K. B.* 1914, 383; *Bean, T. & S.* ii. 353.) H. A vigorous-growing plant, sometimes 20 ft. high. Leaves oblong, 8 in. long, 2½ in. broad; petiole purple, stout, up to 1¼ in. long. Corolla funnel-shaped, 6- or 7-lobed, 2½–3 in. across, white tinged with pink or sometimes distinctly rosy pink. Stamens 12 or 14. Similar to *R. Fortunei*, but the leaves are cuneate, not cordate, at the base, and the margins of the calyx are ciliate. Central China. (J. Veitch & Sons.)

***Rhododendron Faberi.** (*K. B.* 1914, 384.) H. A distinct species, reaching a height of about 20 ft. Young shoots covered with a brown rather loose felt. Leaves hard and stiff, ovate-oblong to oval, 3–8 in. long, 1 4 in. broad, glabrous above, at first reddish-tomentose beneath, afterwards almost glabrous; petiole ½–1 in. long, brown-tomentose. Flowers 6–12, in trusses 3 in. across. Corolla campanulate, 1½–2 in. across, white or white spotted with red. Western China. (J. Veitch & Sons.)

***Rhododendron fastigiatum.** (*G. C.* 1914, lv. 257; *G. M.* 1914, 290; *K. B.* 1914, 51.) H. A very dwarf plant, allied to *R. intricatum*, flowering when only 4 in. high. Leaves closely crowded, overlapping, ovate, ⅓–½ in. long, ⅛–¼ in. broad, covered with rusty dots. Flowers bright lilac-rose, ½–1 in. across, in 4–5-flowered terminal heads. Western China. (G. Reuthe; J. C. Williams.)

***Rhododendron grande x niveum.** (*G. C.* 1914, lv. 239.) G. Garden hybrid. (Kew.)

***Rhododendron Hanceanum.** (*Bean, T. & S.* ii. 360; *K. B.* 1914, 202, t.) H. An evergreen shrub up to 10 ft. high. Leaves oblanceolate to narrowly obovate, ½–4 in. long, ¼–1¾ in. broad, dark green and somewhat scaly above, pale and freely sprinkled with small scales beneath. Flowers numerous in 1 or 2 terminal clusters. Calyx conspicuous, deeply lobed, scaly. Corolla about 1 in. long, deeply lobed, white to clear yellow. Western China. (Arnold Arboretum.)

***Rhododendron Houltstonii.** (*Bean, T. & S.* ii. 361.) H. Closely allied to *R. Fortunei*, which it resembles in its glabrous leaves, purple petioles, and 7-lobed corolla, but it differs in having a glandular-hairy ovary and style. Flowers flesh-pink, about 3 in. across. Central China. Syn. *R. Fortunei*, var. *Houltstonii*, Rehd. & Wils. (J. Veitch & Sons.)

***Rhododendron Lilianii.** (*G. C.* 1914, lv. 191; *G. M.* 1914, 210, f.) H. Garden hybrid between *R. arboreum* and *R. Shilsonii*. (R. Fox; R. Gill & Sons.) [= *R. Cornubia*. See *G. C.* 1914, lv. 238.]

***Rhododendron rotundifolium.** (*Bean, T. & S.* ii. 377; *K. B.* 1914, 204.) H. Very distinct in its nearly orbicular leaves, which are 2–4 in. long, usually not so broad as long. Flowers 8–10 in a terminal truss. Calyx small. Corolla broadly campanulate, 2 in. across, rosy red, 7-lobed. Western China. (J. Veitch & Sons.)

***Rhododendron Sheltonae.** (*Bean, T. & S.* ii. 379.) H. An evergreen shrub 4–6 ft. high. Leaves oval or ovate, 2½–4 in. long, 1–1½ in. broad, dull green above, pale and rather glaucous beneath, quite glabrous; petiole ½–1 in. long. Flowers in trusses of 8 or more. Corolla broadly campanulate, 7-lobed, 1¾ in. across, pink. Western China. (J. Veitch & Sons.)

***Rhododendron strigillosum.** (*K. B.* 1914, 385; *Bean, T. & S.* ii. 381.) H. An evergreen shrub or small tree, up to 20 ft. high, clothed on the young shoots and petioles with stiff whitish gland-tipped bristles ⅛ in. long. Leaves narrowly oblong-lanceolate, cordate at the base, 3–6 in. long, ¾–1½ in. broad, glabrous above, clothed with brown hairs beneath. Flowers campanulate, rich red, 1½ in. long and broad. Pedicel, calyx and seed-pod bristly like the branchlets. Western China and Tibet. (J. Veitch & Sons.)

***Rhododendron taliense.** (*Bean, T. & S.* ii. 382.) H. An evergreen shrub up to 10 ft. high. Leaves thick and leathery, oblong to oval, 2–4 in. long, ¾–1¾ in. broad, dark green and glabrous above, clothed beneath with a close rusty-brown felt; petiole stout, ½ in. long. Flowers 6–12 in a truss. Corolla blush-white, about 1¼ in. long and broad. Western China. (J. Veitch & Sons.)

***Rhododendron villosum.** (*Bean, T. & S.* ii. 384.) H. A distinct species on account of the bristles present on its various parts. An evergreen shrub up to 18 ft. high. Leaves ovate or oblong, pointed, 2–3½ in. long, ¾–1¼ in. broad. Flowers in clusters of 3 or more. Corolla 1¾ in. across, with a funnel-shaped tube and a 5-lobed limb, light to dark purple. Western China. (J. Veitch & Sons.)

Rhododendron violaceum. (*Pl. Wils.* i. 511; *G. C.* 1914, lv. 224.) H. A shrub reaching a height of 4 ft., but sometimes very dwarf and flowers when only 3 or 4 in. high. Leaves similar to those of *R. intricatum*, but more glossy, narrower, and recurved on the margin. Flowers 1–3, terminal, subsessile. Calyx cup-shaped; lobes 5, ¼–1 lin. long. Corolla violet-purple, over 1 in. across, very flat; lobes 5, about ⅓ in. long. Western China. (Arnold Arboretum; E. J. P. Magor.)

Rhododendron Websterianum. (*Pl. Wils.* i. 511; *R. H.* 1914, 325.) H. A very much branched shrub reaching a height of about 3 ft. Leaves crowded, ovate or elliptic, 3–7½ lin. long, 1½–4½ lin. broad, greyish-white and densely scaly on the under side. Flowers solitary, rarely 2 or 3 together, terminal. Calyx deeply 5-lobed; lobes 1–2½ lin. long. Corolla funnel-shaped, rose-purple, 1–1¼ in. across. Western China. (Arnold Arboretum; L. Chenault, Orleans.)

***Rhododendron Williamsianum.** (*Pl. Wils.* i. 538; *K. B.* 1914, 205.) H. Belongs to the same group as *R. Souliei*, and is characterised by its slender almost twiggy branchlets, which branch diffusely, and its glandular bristly young shoots, petioles and pedicels. Flowers 3–5 in a terminal cluster. Calyx small. Corolla campanulate, 5-lobed, 1¼ in. long, 1½ in. broad, pale rose, unspotted. Western China. (Arnold Arboretum.)

Rhododendron Willmottiae. (*G. C.* 1914, lv. 319.) H. A small free-flowering plant with bronze-tinted

young leaves and showy white or pale cream-coloured flowers. China. (Miss Willmott.) [= *R. Hanceanum*, Hemsl.]

Rhododendron Wilsonae. (*Bean, T. & S.* ii. 386.) H. An evergreen shrub up to 6 or 7 ft. high. Leaves narrowly oval or oval-lanceolate, acuminate at the apex, 2½–4½ in. long, 1–1¾ in. broad, glabrous; petiole up to ½ in. long. Flowers slightly fragrant, solitary, axillary, 4–6 at the ends of the shoots. Corolla pale purple, about 2 in. across, funnel-shaped at the base, 5-lobed. Central China. (J. Veitch & Sons.)

***Rhododendron Wiltonii.** (*Bean, T. & S.* ii. 386.) H. An evergreen shrub up to 8 ft. high, characterised by the young shoots, underside of the leaves and the ovary being densely clothed with a pale brown wool, and by the deeply wrinkled leaves, which are obovate, 2–3½ in. long and ¾–1¼ in. broad. Flowers in a cluster of 6 or more. Corolla pink, campanulate, 1¼ in. across, with 5 almost erect lobes. Western China. (J. Veitch & Sons.)

***Rhus Henryi.** (*G. C.* 1914, lv. 345; *Bean, T. & S.* ii. 393.) Anacardiaceae. H. A large deciduous shrub or small tree. Leaves pinnate, 10–16 in. long; leaflets 7–11, oblong to oblong-lanceolate, 2½–5 in. long, 1–1¾ in. broad, entire or sparingly toothed. Flowers small, greenish-white, in terminal pyramidal panicles 3–7 in. long. Fruits rich red, downy, about the size of peppercorns. Central and Western China. (Arnold Arboretum; Hon. Vicary Gibbs.) [According to *Pl. Wils.* ii. 177, this is the plant in gardens and included in the list of 1908 as *R. sinica*, and its correct name is *R. Potaninii*, Maxim. The true *R. sinica*, Diels (= *R. punjabensis*, var. *sinica*, Rehd. & Wils.), is now in cultivation. See *Bean, T. & S.* ii. 393.]

***Ribes Brocklebankii.** (*G. C.* 1914, lv. 402; *G. M.* 1914, 477.) Saxifragaceae. H. A sport from *R. sanguineum*. Leaves golden-yellow. (T. Winkworth.) [*R. sanguineum aureum Brocklebankii*; G. C. 1914, lv. 422.]

***Ribes curvatum.** (*Bean, T. & S.* ii. 401.) H. Closely allied to *R. niveum*, which it resembles in its white flowers and hairy style and stamens, but it differs in the glandular ovary and often glabrous anthers, and it is much dwarfer in habit. The plant is armed with slender simple or triple spines, and has roundish 3–5-lobed leaves, usually 1 in. or less across. South-Eastern United States. (Arnold Arboretum; Kew.)

Ribes Henryi. (*G. C.* 1914, lvi. 29.) H. A dioecious species resembling *R. laurifolium*, being spineless and having persistent entire leathery leaves, but it is viscid, and the fruit is green, glandular and hispid. Western China. (Edinburgh B. G.)

***Ribes montigenum.** (*Bean, T. & S.* ii. 403.) H. Intermediate between the sections *Grossularia* and *Ribesia*, and allied to *R. lacustre*, but it has shorter racemes of only 6–10 flowers, and bright red fruits. Western North America. (Kew.)

Ribes wollense. (*K. B.* 1914, 49, 382, foot-note, t.; *G. C.* 1914, lv. 406.) H. The name given to a plant supposed to be a hybrid between *R. nigrum* and *R. Grossularia*, but since identified with the North American *R. divaricatum*, Dougl. (W. J. Bell.)

***Romanzoffia unalaschcensis.** (*G. C.* 1914, lv. 411, as *R. unalachcensis*.) Hydrophyllaceae. H. A small plant with smooth leaves and white flowers, closely resembling some of the Saxifrages. Unalaska and neighbouring islands. (S. Arnott.)

***Rosa corymbulosa.** (*B. M.* t. 8566.) Rosaceae. H. A distinct new species with unarmed or sparingly prickly branches and numerous small flowers in corymb-like inflorescences. Flowers ¾–1 in. across. Petals broadly obcordate, deep rose above, white at the base. Fruits globose, glandular, about ⅓ in. long, crowned by the persistent sepals. Central China. (Arnold Arboretum; Kew.)

Roscoea alpina. (*Gard.* 1914, 159.) Scitamineae. H. A very hardy free-growing plant with fine purple flowers. Himalayas. (Bees, Ltd.)

***Rubus Lambertianus,** var. **glaber.** (*Bean, T. & S.* ii. 462.) Rosaceae. H. Differs from the type in having round stems, which like the leaves are smooth or nearly so, and yellow instead of red fruits. China and Japan. (Arnold Arboretum.)

***Rubus malifolius.** (*Bean, T. & S.* ii. 463.) H. Stems prostrate or climbing, sparingly armed with short recurved prickles. Leaves oval or ovate, 2–5 in. long, 1–2 in. broad, broadly and shallowly toothed. Flowers 1 in. across, in terminal racemes 2–4 in. long. Fruits rather large, black, of an unpleasant flavour.

An elegant species with handsome flowers. Western China. (Arnold Arboretum.)

***Rubus trianthus.** (*Bean, T. & S.* ii. 469.) H. A deciduous shrub of wide-spreading habit, differing from most species in being quite glabrous. Stems erect, much branched, prickly, blue-white, 4–6 ft. high. Leaves ovate to triangular, more or less 3-lobed, 3–6 in. long, 1½–4½ in. broad. Flowers pinkish-white, insignificant. Fruit dark red. Central China. (J. Veitch & Sons.)

***Salix Pierotii.** (*Bean, T. & S.* ii. 487.) Salicaceae. H. A compact much branched shrub up to 6 or 8 ft. high. Leaves rather crowded, lanceolate, finely and regularly toothed, 2–5 in. long, ½–1⅛ in. broad, brilliant deep green and soon quite glabrous above, vivid blue-white and at first somewhat silky beneath, later glabrous; petiole ⅛–¼ in. long. Catkins leafy at the base, 1–2 in. long. Stamens solitary, rarely 2. Introduced about 1903. Japan.

Salvia longistyla. (*B. M.* t. 8590.) Labiatae. G. Plant reaching a height of 14 or 15 ft. Leaves petiolate, cordate-ovate, 3–5½ in. long, 2–4½ in. broad. Racemes 15–25 in. long. Flowers 8 16 in each whorl. Corolla long-exserted, red-pink, rather more than 1 in. long. A re-introduction; it was in cultivation first about 1833. Syns. *S. rectiflora*, Vis., *S. aristulata*, Mart. & Gal. Mexico. (Dr. Robertson-Proschowsky, Nice.)

***Sansevieria intermedia.** (*K. B.* 1914, 83.) Liliaceae. S. A new species very similar to *S. cylindrica*, but the leaves are channelled, the edges of the channel being acute below and obtusely rounded above. British East Africa. (Kew.)

***Saponaria ocymoides alba.** (*R. H.* 1914, 334; *J. H. F.* 1914, 384.) Caryophyllaceae. H. A form with pure white flowers which may be propagated true from seeds. It was obtained by crossing a white-flowered but sterile form with *S. ocymoides versicolor*. (Vilmorin-Andrieux & Co., Paris.)

Sarcanthus robustus. (*G. C.* 1914, lv. 21, f. 12, as *S. robustum*.) Orchidaceae. S. A new species with narrowly oblong leaves about 6 in. long, and a few-flowered spike of cream-white to blush-white flowers marked with claret-purple. Borneo. (Hon. N. C. Rothschild.)

***Sassafras Tzumu.** (*Bean, T. & S.* ii. 501.) Lauraceae. H. A tree reaching a height of 50 ft., distinguished from *S. officinale* by some small differences in the structure of the flower, by having glabrous shoots and leaves and a different habit of growth. Central China. (Kew.)

Saxifraga cinerascens. (*N. B. G. Edinb.* v. 142, t. 98; *G. C.* 1914, lv. 15.) Saxifragaceae. H. ? A densely tufted plant 2–4 in. high, with few-leaved 1–3-flowered stems, covered in the lower part with black glandular hairs. Basal leaves linear-lanceolate, 3½–5 lin. long, horny on the margin, loosely ciliate, bristle-pointed. Flowers golden-yellow. Yunnan, China. (Edinburgh B. G.)

Sedum Cockerellii. (*G. C.* 1914, lv. 67.) Crassulaceae. H. ? A small not very conspicuous species with white petals and bright pink styles. New Mexico. (T. D. A. Cockerell, Boulder, Colorado, U.S.A.)

***Sedum rariflorum.** (*K. B.* 1914, 208.) H. Allied to *S. algidum*, but well distinguished by the loosely-branched stems, 1-flowered branchlets, spreading sepals, and somewhat bristly-pointed petals, which are white, oblong-lanceolate, and nearly ½ in. long. North China. (Kew.)

***Sempervivum ciliosum.** (*K. B.* 1914, 379.) Crassulaceae. H. A new species related to *S. Braunii*, but it is easily distinguished by the much denser rosettes almost flat at the apex, and the distinctly longer hairs of the leaves. Country not recorded. (Kew; Cambridge B. G.)

Senecio Purdomii. (*K. B.* 1914, 327.) Compositae. H. Stem erect, round, densely yellow-pubescent. Leaves radical, broadly orbicular, cordate at the base, regularly toothed, about 1 ft. long and 1⅓ ft. broad; petiole long. Inflorescence paniculate; branches densely tawny-pubescent. Flower-heads obconical, up to ⅔ in. long, about ⅓ in. across. Florets all tubular. North-West China. (J. Veitch & Sons.)

Sinomenium acutum, var. **cinereum.** (*Pl. Wils.* i. 387; *G. C.* 1914, lv. 373.) Menispermaceae. H. A pretty climbing plant with shining green leaves and stems. Flowers inconspicuous. It differs from the typical form in having the leaves pilose above, then glabrescent, and softly pilose and glaucous beneath. Syn. *Cocculus diversifolius*, var. *cinereus*, Diels.

Central China. (Arnold Arboretum; Hon. Vicary Gibbs.)

Smilacina paniculata. (*B. M.* t. 8539.) Liliaceae. G. A glabrous erect herb. Leaves ovate-lanceolate, long-acuminate, 5–6 in. long, 1½ in. broad above the base. Panicle terminal, 2¼ in. long and broad, altogether snowy white. Flowers about 1⅓ in. across. Guatemala and Southern Mexico. (F. Sander & Sons.)

Smilax Sieboldii. (*Bean, T. & S.* ii. 518.) Liliaceae. H. A deciduous or semi-evergreen species. Stems round or somewhat ribbed, more or less armed with slender prickles. Leaves ovate, cordate at the base, 1½–3 in. long. Flowers green, 4–7 in small umbels. Introduced in 1908 or before. Japan and South China.

Sophro-laelio-cattleya Herbertii. (*G. C.* 1914, lv. 201.) Orchidaceae. G. Garden hybrid between *Sophro-laelia heatonensis* and *Cattleya F. W. Wigan.* (H. S. Goodson.)

Spathoglottis pulchra. (*O. R.* 1914, 17.) Orchidaceae. S. A plant with this name is in cultivation, but no description is given, and it is uncertain whether it is *S. pulchra*, Schlechter, from the Bismarck Archipelago. (Edinburgh B. G.)

***Stapelia Leendertziae.** (*B. M.* t. 8561.) Asclepiadaceae. G. A remarkable species, differing from all other Stapelias except *S. nobilis* in having a campanulate corolla with a distinct tube, 2–2½ in. long, instead of a flat saucer-shaped one. The corolla is dull dark purple, shortly hairy outside and furnished with long purple hairs inside. Transvaal. (W. E. Ledger; Kew.)

***Stewartia monadelpha.** (*Bean, T. & S.* ii. 553.) Ternstroemiaceae. H. A deciduous shrub or small tree. Young shoots at first clothed with fine hairs. Leaves oval or ovate-oblong, 1½–4 in. long, ⅝–1¾ in. broad, at first hairy on both sides, becoming almost glabrous; petiole ⅛–¼ in. long. Flowers solitary and axillary, 1–1½ in. across, white, fragrant. Distinguished from *S. Pseudo-camellia* by the hairy shoots and leaves. China and Japan. (J. Veitch & Sons.)

***Streptocarpus Banksii.** (*G. C.* 1914, lvi. 192, f. 75.) Gesneraceae. G. Garden hybrid between *S. Wendlandii* and a plant of hybrid origin. (Cambridge B. G.)

Streptocarpus Blythinii. (*G. C.* 1914, lvi. 258, f. 104.) G. Garden hybrid between *S. Wendlandii* and *S. cyanea.* (Cambridge B. G.)

***Styrax Veitchiorum.** (*Bean, T. & S.* ii. 560.) Styracaceae. H. Tree 12–15 ft. high, covered on the young shoots, petioles and calyx with a close grey stellate pubescence. Leaves lanceolate, remotely and shallowly toothed, 3–5 in. long, ¾–1 in. broad; petiole ¼–⅓ in. long. Flowers white, nearly 1 in. across, forming slender panicles 4–8 in. long at the ends of the current season's growths. Central China. (J. Veitch & Sons.)

***Syringa alborosea.** (*K. B.* 1914, 187.) Oleaceae. H. Shrub, up to 10 ft. high. Leaves elliptic, 2–4 in. long, 1–2 in. broad, sparingly pubescent on both sides; petiole up to ¾ in. long. Inflorescence terminal, erect, 2–5 in. long. Corolla-tube 4–5 lin. long, pale rose; lobes 1¼–1½ lin. long, ovate, white. China. (J. Veitch & Sons.)

***Tilia paucicostata.** (*Bean, T. & S.* ii. 594.) Tiliaceae. H. Most closely resembles *T. cordata* in general appearance. It has glabrous young shoots and very obliquely ovate leaves, conspicuously and fairly regularly toothed except at the apex and base, 2–3½ in. long and 1½-2½ in. broad, sometimes much larger. It is believed to be in cultivation under the erroneous name of *T. Miqueliana*, var. *chinensis.* Western China. (J. Veitch & Sons.)

***Tillandsia Benthamiana,** var. **Andrieuxii.** (*B. M.* t. 8576.) Bromeliaceae. S. A succulent almost stemless herb. Leaves densely clustered, ovate-lanceolate at the base, ensiform-acuminate above, 6 in. long, ½ in. broad at the base. Scape 3–6 in. long. Inflorescence spicate, oblong, 3 in. long. Flowering-bracts ovate with rounded tips, rose-pink, white-scaly, ¾ in. long. Flowers 1¼ in. long, deep violet. Costa Rica and Mexico. (Kew.)

***Trichocaulon pictum.** (*B. M.* t. 8579.) Asclepiadaceae. S. Stem subglobose or cylindric-oblong, 1½–3 in. long, 1½–2 in. thick, very blunt, sparingly branched at the base, irregularly tubercled. Flowers 2–4 together in fascicles, erect. Corolla ⅓ in. across, whitish but marked with many close-set purple dots and short streaks. Coronas yellowish and purple. Little Namaqualand. (Kew.)

***Trillium rivale.** (*G. C.* 1914, lv. 224.) Liliaceae. H. A very small species having stems only about 3 in. high. Rootstock creeping. Flowers erect, cup-shaped, about 1 in. across, white, richly dotted with rose. The 3 bracts are stalked and are borne about 2 in. below the flower. Western North America. (J. Box.)

***Ulmus Shirasawana.** (*B. S. D. F.* 1914, 27, ff.) Urticaceae. H. A new species in cultivation as *U. parvifolia*. Its distinguishing characters are: Leaves deciduous, ovate or ovate-lanceolate, crenate-dentate, with fewer (8–10) pairs of bifurcate nerves. Flowers greenish- or yellowish-white. Fruit distinctly stalked, abruptly contracted at the apex into a beak. Japan. (P. L. de Vilmorin, Verrières-le-Buisson, France; Kew.)

Ulmus Sieboldii. (*B. S. D. F.* 1914, 26, ff.) H. This has been confused with *U. parvifolia*, from which it differs in the more prominent teeth of its ovate or ovate-lanceolate deciduous leaves, which have small tufts of hairs in the axils of the principal veins beneath, in having a yellowish instead of red perianth and a fruit twice as large, with a much longer stalk. Syn. *U. japonica*, Siebold, not of Sargent. Japan. (Montpellier B. G.; Arboretum Segrezianum, etc.)

Vanda coerulea Rogersii. (*O. R.* 1914, 31.) Orchidaceae. S. "A distinct, nearly white variety, with flowers of moderate size and an unusually long spur." (O. O. Wrigley.)

Vanda coerulescens, var. **Hennisiana.** (*Orchis*, 1914, 83.) S. Flowers similar in colour to those of *V. coerulea*, with a dark blue lip which is scarcely lobed in front, and a slender spur about ½ in. long. (W. Hennis, Hildesheim, Germany.)

Vanda Lowii, var. **Le Moinierii.** (*R. H. B.* 1914, 29, f.) S. In this variety the first flowers are dull yellow, marked with numerous large purple-brown spots; the other flowers have numerous brown-red almost round sometimes confluent blotches on a somewhat greenish-yellow ground. (R. Le Moinier, St. Maurice, Lille, France.) [*Arachnanthe Lowii*, var.]

Vanda striata. (*O. R.* 1914, 220.) G. Allied to *V. cristata*, from which it differs in its smaller flowers and the more obtuse spur of the lip. A reintroduction; it was in cultivation in 1874. North-West Himalaya. (R. R. D. Troup.)

Veronica gigantea. (*Bean, T. & S.* ii. 639.) Scrophulariaceae. H. A tree sometimes 25 ft. high, forming a well-defined trunk. Leaves 2–4 in. long, ⅓–½ in. broad, minutely hairy on the margins. Racemes about as long as the leaves. Flowers white, 1–5 in. across. Corolla-tube about as long as the calyx. Syn. *V. salicifolia*, var. *gigantea*, Cheeseman. Chatham Islands. (Captain A. A. Dorrien Smith.)

***Viburnum kansuense.** (*Bean, T. & S.* ii. 651.) Caprifoliaceae. H. A deciduous shrub 4–8 ft. high, belonging to the *Opulus* group, but it is distinct in having no showy sterile flowers, and the leaves are frequently small and deeply lobed, suggesting a small maple leaf. Western China. (Arnold Arboretum.)

Vitis armata, var. **cyanocarpa.** (*Pl. Wils.* i. 104; *G. C.* 1914, lv. 373.) Ampelidaceae. H. Differs from the type in having fewer prickles or sometimes almost none on the branches of the current year. It is possibly the same as the plant in cultivation under the varietal name *Veitchii*. Central China. (Arnold Arboretum; Hon. Vicary Gibbs.)

Vitis himalayana, var. **rubrifolia.** (*G. C.* 1914, lv. 373.) H. A clinging variety with dark purple leaves having silver-white veins. Western China. (Arnold Arboretum; Hon. Vicary Gibbs.) [= *Parthenocissus himalayana*, var. *rubrifolia*, Gagnep. in *Pl. Wils.* i. 101.]

Xanthorrhoea undulatifolia. (*B. T. O.* 1914, 193.) Juncaceae. G. The specimen described has a trunk about 8 ft. high and 12 in. in diameter. Leaves in a large elegant crown, fragile, sword-shaped, reflexed, rhomboidal in section, 5 ft. long. Scape quite erect, cylindric, about 12 ft. long, with a dense spike of golden-yellow flowers. Australia. (Palermo B. G.)

Xylosma Aquifolium. (*K. B.* 1914, 151.) Bixaceae. S.? A plant with holly-like leaves, which have a pair of glands at the base of the blade, and short axillary racemes of very small flowers. Country unknown. (Melbourne B. G.)

***Zephyranthes cardinalis.** (*B. M.* t. 8553.) Amaryllidaceae. H.H. A new species allied to *Z. concolor*, from which it differs in the shorter pedicel, shorter narrowly tubular spathe and bright red perianth. Pedicel ¾ in. long. Spathe ⅔ in. long. Perianth-tube funnel-shaped, 1 in. long; segments broadly oblong-oblanceolate. America (country not known). Cultivated in Bahama Islands. (Kew.)

Zygopetalum Blackii. (*G. C.* 1914, lvi. 283; *O. W.* v. 41.) Orchidaceae. G. Garden hybrid between *Z. crinitum* and *Z. Perrenoudii*. (Flory & Black.)

***Zygopetalum Prainianum.** (*K. B.* 1914, 376; *O. R.* 1914, 317; *B. M.* t. 8610.) G. Similar to *Z. Burkei*, but it has longer pseudobulbs, broader leaves, and differently coloured flowers. Sepals and petals dusky brown, with obscure green stripes on the petals. Lip white, streaked with rose-purple on the fleshy ribs of the callus. Peru. (F. Sander & Sons.)

ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

APPENDIX IV.—1915.

LIST of STAFFS of the ROYAL BOTANIC GARDENS, Kew, and of Botanical Departments, Establishments and Officers at Home, and in India and the Colonies, in Correspondence with Kew.

* Trained at Kew. † Recommended by Kew.

Royal Botanic Gardens, Kew.—

Director - - - - -	Lieut.-Col. Sir David Prain, I.M.S., C.M.G., C.I.E., M.A., M.B., LL.D., F.R.S., F.L.S.
Assistant Director - - -	Arthur W. Hill, M.A., F.L.S.
Assistant, First Class - - -	*John Aikman.
,, Second Class - - -	*William Nicholls Winn.

Keeper of Herbarium and Library	Otto Stapf, Ph.D., F.R.S., F.L.S.
Assistant, First Class - - -	Charles Henry Wright, A.L.S.
,, ,, ,, - - -	*Robert Allen Rolfe, A.L.S.
,, Second Class - - -	*Sidney Alfred Skan.
,, ,, ,, - - -	Thomas Archibald Sprague, B.Sc., F.L.S.
,, ,, ,, - - -	Elsie Maud Wakefield, F.L.S.
,, ,, ,, - - -	Munro Briggs Scott, M.A., B.Sc.
,, ,, ,, - - -	*William Bertram Turrill.
,, ,, ,, - - -	*John Hutchinson.
,, for India - -	*Mary Letitia Green, B.Sc.
,, for Tropical Africa - -	*Frederick Flippance.

Assistant, First Class, Plant Pathology Laboratory.	Arthur Disbrowe Cotton, F.L.S.
,, ,, ,,	William Broadhurst Brierley, M.Sc.

(6310—18.) Wt. 153—601. 1125. 10/15. D & S. 17/26.

Royal Botanic Gardens, Kew—*continued.*

Assistant Keeper, Jodrell Laboratory.	Leonard Alfred Boodle, F.L.S.

Keeper of Museums	John Masters Hillier.
Assistant, Second Class	*John H. Holland, F.L.S.
" " "	*William Dallimore.
Preparer	George Badderly.

Curator of the Gardens	William Watson, A.L.S.
Assistant Curator	*William J. Bean.
Foremen :—	
Herbaceous Department	*Walter Irving.
Arboretum	*Arthur Osborn.
Greenhouse and Ornamental Department.	*John Coutts.
Tropical Department	*Charles P. Raffill.
Temperate House	*William Taylor.
Storekeeper	*George Dear.

Aberdeen.—University Botanic Garden :—

Professor	J. W. H. Trail, M.A., M.D., F.R.S., F.L.S.

Cambridge.—University Botanical Department :—

Professor	A. C. Seward, M.A., F.R.S., F.L.S.
Curator, University Herbarium.	C. E. Moss, D.Sc.
Curator, University Museum.	H. H. Thomas, B.A.
Curator of Garden	*Richard Irwin Lynch, M.A., A.L.S.

Dublin.—Royal Botanic Gardens, Glasnevin :—

Keeper	Sir Frederick W. Moore, M.A., F.L.S.
Assistant	——

Trinity College Botanic Gardens :—

Professor	H. H. Dixon, Sc.D., F.R.S.

Edinburgh.—Royal Botanic Garden :—

Regius Keeper	I. B. Balfour, M.A., M.D., LL.D., Sc.D., F.R.S., F.L.S.
Assistant to Regius Keeper.	W. W. Smith, M.A.
Assistant (Museum)	H. F. Tagg, F.L.S.
" (Herbarium)	*J. F. Jeffrey.
Head Gardener	*R. L. Harrow.
Assistant Gardener	Henry Hastings.

Glasgow.—Botanic Gardens :—

University Professor	F. O. Bower, M.A., Sc.D., F.R.S., F.L.S.
Curator	James Whitton.

Oxford.—University Botanic Garden :—

Professor	Sydney H. Vines, M.A., Sc.D., F.R.S., F.L.S.
Curator	*William G. Baker.

AFRICA.

Union of South Africa.—

Pretoria.—Department of Agriculture :—

Chief, Division of Botany	†I. B. Pole Evans, B.Sc., F.L.S.
Chief Conservator of Forests.	C. E. Legat, B.Sc.

Cape Town.—National Botanic Garden :—

Director - - - -	H. H. W. Pearson, M.A., Sc.D., F.L.S.
Curator - - - -	*J. W. Mathews.
Gardener - - - -	*A. W. Maynard.

Durban.—Natal Herbarium :—

Acting Mycologist, in charge.	P. van der Byl.

Cape Province.—

Cape Town.—Professor of Botany, South African College. — H. H. W. Pearson, M.A., Sc.D., F.L.S.

South African Museum Herbarium :—

Assistant in charge -	E. P. Phillips, M.A., D.Sc., F.L.S.
Curator, Bolus Herbarium.	Mrs. F. Bolus.

Gardens and Public Parks :—

Superintendent - -	*G. H. Ridley.

Grahamstown.—Albany Museum :—

Superintendent of Herbarium.	S. Schönland, Ph.D.

Gardens and Public Parks :—

Curator - - -	E. J. Alexander.
Port Elizabeth - Superintendent - -	John T. Butters.
King Williamstown. Curator - - -	George Lockie.
Graaff-Reinet - „ - - -	*C. J. Howlett.
Uitenhage - „ - - -	H. Fairey.

Natal.—

Durban.—Municipal Gardens :—

Curator - - -	*James Wylie.

Pietermaritzburg.—Botanic Garden :—

Curator - - -	*W. J. Newberry.

Transvaal.—

Pretoria.—Transvaal Museum :—

Superintendent of Herbarium - -	Mrs. R. Pott.

British East Africa Protectorate.—

Nairobi - -	Director of Agriculture.	Hon. A. C. Macdonald.
	Mycologist - -	†W. J. Dowson, M.A.
	Chief of Economic Plant Division.	*Henry Powell.
	Agricultural Instructor, Coast Region.	G. Farmer.
	Conservator of Forests	E. Battiscombe.

Egypt.—

Cairo.—Ministry of Agriculture :—

Consulting Agriculturist.	Gerald C. Dudgeon, F.E.S.
Inspector General -	A. T. McKillop.
Botanist - - -	B. G. C. Bolland, B.A.
Director of Horticulture.	*T. W. Brown.
Assistant Director -	*F. G. Walsingham.
,, ,,	*G. S. Crouch.

Gold Coast.—Agricultural Department :—

Director of Agriculture.	W. S. D. Tudhope.
Assistant Director -	R. H. Bunting.
Travelling Instructor	*Alfred E. Evans.
Agriculturist - -	H. G. S. Branch.
Senior Curator - -	*A. C. Miles.
,, ,, - -	C. Saunders.
,, ,, - -	*A. B. Culham.
,, ,, - -	*T. Hunter.
Curator - - -	M. D. Reece.
,, - - -	*G. H. Eady.
,, - - -	*E. W. Morse.
Conservator of Forests -	N. C. McLeod.

Nigeria.—

Southern Provinces.—Agricultural Department :—

Director of Agriculture.	*W. H. Johnson, F.L.S.
Assistant Director -	A. H. Kirby, B.A.
Mycologist- - -	†C. O. Farquharson, M.A.
Superintendent of Agriculture.	S. V. Henderson.
,, ,,	*F. Evans, F.L.S.
Assistant Superintendent.	*R. Gill.
,, ,,	A. J. Findlay, M.A., B.Sc.
,, ,,	H. G. Burr, B.Sc.
Curator - - -	*A. R. Bell.
,, - - -	*C. Warren.
Chief Conservator of Forests -	H. N. Thompson.

Northern Provinces.—Agricultural and Forestry Department :—

Director of Agriculture.	P. H. Lamb.
Assistant Superintendent.	R. Nicol.
,, ,,	K. T. Rae.
,, ,,	T. Thornton.
,, ,,	†A. Wainwright.
,, ,,	†J. E. T. Hartley.
Senior Conservator of Forests.	*E. W. Foster.

Nyasaland Protectorate.—

Zomba.—Agricultural and Forestry Department :—

Director of Agriculture.	J. S. J. McCall.
Agriculturist - -	*E. W. Davy.
" - -	J. Jennings.
Assistant Agriculturist.	A. P. Cliff.
" "	D. M. Archdale.
" "	H. Munro.
Chief Forest Officer -	*J. M. Purves.

Rhodesia.—

Bulawayo.—Rhodes Matopos Park :—

Curator - - -	W. E. Dowsett.

Salisbury.—Department of Agriculture :—

Director - - -	E. A. Nobbs, Ph.D., B.Sc.
Agriculturist and Botanist.	H. G. Mundy, F.L.S.

Sierra Leone.—Agricultural Department :—

Director of Agriculture.	W. Hopkins.
Assistant Director -	D. W. Scotland.
" -	J. M. Watt.
Conservator of Forests -	C. E. Lane-Poole.

Soudan.—

Khartoum -	Director of Agriculture and Forests.	Major E. B. Wilkinson.
	Superintendent of Palace Gardens.	*F. S. Sillitoe.
Jebelin - -	Superintendent of Experimental Plantations.	*T. Cartwright.

Uganda.—

Kampala—Agricultural Department :—

Director of Agriculture.	S. Simpson, B.Sc.
Botanist - - -	W. Small, M.A., B.Sc.
District Agricultural Officer.	E. T. Bruce.
" "	A. R. Morgan.
" "	L. Hewett.
" "	R. G. Harper.
" "	*T. D. Maitland.
" " -	*J. D. Snowden.
Assistant "	

Entebbe—Botanical, Forestry and Scientific Department :—

Chief Forestry Officer	W. R. Rutter.
Assistant - -	*Robert Fyffe.
" - - -	W. Howells.
	F. C. McClellan, F.L.S.

Zanzibar - -	Director of Agriculture.	Robert Armstrong.
	Assistant Director -	

AUSTRALIA.

New South Wales.—Botanic Gardens :—

Sydney - -	Director and Government Botanist.	J. H. Maiden, F.L.S.
	Superintendent -	E. N. Ward.
	Botanical Assistant -	E. Cheel.
	,, ,, -	A. A. Hamilton.
	,, ,, -	W. F. Blakeley.
University Professor of Botany -		A. Anstruther Lawson, D.Sc., Ph.D., F.L.S.

Technological Museum :—

Curator - - -	R. T. Baker, F.L.S.
Director of Forests - - -	R. D. Hay.

Queensland.—

Brisbane - -	Colonial Botanist -	——

Botanic Gardens :—

Director - - -	J. F. Bailey.

Acclimatisation Society's Gardens :—

Secretary - - -	L. G. Corrie, F.L.S.
Manager - - -	R. W. Peters.

Forest Department :—

Director - - -	N. W. Jolly, B.Sc.

Cairns.—Instructor in Tropical Agriculture. ——

Kamerunga State Nursery :—

Manager - - -	C. E. Wood.

Rockhampton - Superintendent - - - R. Simmons.

South Australia.—

Adelaide.—University Professor of Botany. T. G. B. Osborn, M.Sc.

Botanic Gardens :—

Director - - -	Maurice Holtze, Ph.D., F.L.S.

Woods and Forests :—

Conservator - -	Walter Gill, F.L.S.

Northern Territory.—

Port Darwin.—Botanic Gardens :—

Curator - - -	*C. E. F. Allen.

Tasmania.—

Hobart - -	Government Botanist	Leonard Rodway.
	Chief Forests Officer -	J. C. Penny.

Botanic Gardens :—

Superintendent - -	J. Wardman.

Victoria.—

Melbourne.—Botanic Gardens :—

Director - - -	J. Cronin.

National Herbarium :—

Government Botanist and University Professor of Botany.	A. J. Ewart, D.Sc., Ph.D., F.L.S.

Conservator of Forests - - - H. R. Mackay.

Western Australia.—

Department of Agriculture :—

Botanist and Pathologist.	F. Stoward, D.Sc.

BERMUDA.

Agricultural Department :—
Director - - - - - E. J. Wortley, F.C.S.

CANADA.

Ottawa - -	Director of Government Experimental Farms.	J. H. Grisdale.
	Dominion Horticulturist and Curator of Botanic Garden.	W. T. Macoun.
	Dominion Botanist -	H. T. Güssow.
	Assistant - - -	J. W. Eastham, B.Sc., F.L.S.
	„ - - -	F. Fyles, B.A.
Vancouver -	Provincial Botanist -	J. Davidson, F.L.S.

CEYLON.

Peradeniya.—Department of Agriculture :—

Director of Agriculture - - - R. N. Lyne, F.L.S.
Botanist and Mycologist- - - †T. Petch, B.A., B.Sc.
Assistant Botanist and Mycologist - †G. Bryce, M.A., B.Sc.
Manager, Peradeniya Experiment Station. D. S. Corlett.
Superintendent of Botanic Gardens *H. F. Macmillan, F.L.S.
Curator of Royal Botanic Gardens, Peradeniya. *T. H. Parsons.
Curator, Hakgala Gardens - - *J. J. Nock.
Conservator of Forests - - - H. F. Tomalin.

CYPRUS.

Principal Forest Officer - - A. K. Bovill.
Director of Agriculture - - W. Bevan.

FALKLAND ISLANDS.

Government House Garden :—
Head Gardener - - - - - *A. W. Benton.

FIJI.

Superintendent of Agriculture - - Charles H. Knowles.

Botanic Station :—
Curator - - - - - - *Daniel Yeoward.

HONG KONG.

Botanic and Forestry Department :—
Superintendent - - - - *W. J. Tutcher, F.L.S.
Assistant Superintendent - - - *H. Green.

MALTA.

Inspector of Agriculture	-	Francesco Debono, M.D.
Superintendent of Public Gardens	-	J. Borg, M.D.

MAURITIUS.

Reduit.—Department of Agriculture :—

Director	-	F. A. Stockdale, M.A., F.L.S.
Assistant Director	-	†G. G. Auchinleck, B.Sc.
Agricultural Instructor	-	*F. Birkinshaw.

Pamplemousses.—Department of Forests :—

Director	-	Paul Koenig.

NEW ZEALAND.

Dunedin	Superintendent	*D. Tannock.
Napier	,,	W. Barton.
Auckland	Ranger	William Goldie.
Christchurch	Head Gardener	— Young.

SEYCHELLES.

Botanic Station :—

Curator	-	P. R. Dupont.

STRAITS SETTLEMENTS.

Straits Settlements.—Botanic Gardens :—

Singapore	Director	†I. H. Burkill, M.A., F.L.S.
	Assistant Director	*T. F. Chipp, B.Sc., F.L.S.
	Assistant Superintendent	*J. W. Anderson.

Federated Malay States.—Forest Department :—

Conservator (Acting)	-	B. H. F. Barnard.

Federated Malay States—*continued.*

Kuala Lumpur.—Agricultural Department :—

Director of Agriculture.	†L. Lewton-Brain, B.A., F.L.S.
Chief Agricultural Inspector.	†F. W. South, B.A.
Assistant Inspector -	F. Norris.
,, ,, -	A. G. G. Ellis.
,, ,, -	P. B. Richards.
,, ,, -	†H. W. Jack, B.A., B.Sc.
Agriculturist - -	†F. G. Spring.
Assistant Agriculturist	B. Bunting.
Mycologist (Acting) -	†A. Sharples.
Assistant Mycologist -	†W. N. C. Belgrave, B.A.
,, ,,	——
Economic Botanist -	†G. E. Coombs, B.Sc.
Superintendent Government Plantations.	*J. N. Milsum.

Perak (Taiping).—Government Gardens and Plantations :—

Superintendent - -	——

Selangor and Negri Sembilan.—

Superintendent - -	*J. Lambourne.

WEST INDIES.

Imperial Department of Agriculture :—

Barbados - -	Commissioner - -	Francis Watts, C.M.G., D.Sc., F.I.C., F.C.S.
	Scientific Assistant -	W. R. Dunlop.
	Mycologist and Agricultural Lecturer.	W. Nowell.
Antigua.—Government Chemist and Superintendent of Agriculture, Leeward Islands.		H. A. Tempany, B.Sc., F.I.C., F.C.S.
Botanic Station :—		
	Curator - - -	*T. Jackson.
	Agricultural Assistant	C. A. Gomes.
Barbados.—Department of Agriculture.		
	Superintendent -	——
	Assistant Superintendent.	J. S. Dash, B.Sc.
Dominica.—Botanic Station :—		
	Curator - -	*Joseph Jones.
	Assistant Curator -	G. A. Jones.
Grenada.—Botanic Garden :—		
	Agricultural Superintendent.	*J. C. Moore.
	Agricultural Instructor	W. N. M. Smith.

Montserrat.—Botanic Station :—

Curator - - -	*W. Robson.

St. Kitts-Nevis.—Botanic Station :—

Agricultural Superintendent.	F. R. Shepherd.
Agricultural Instructor, Nevis.	W. I. Howell.

St. Lucia.—Botanic Station :—

Agricultural Superintendent.	*A. J. Brooks, F.L.S., F.C.S.
Overseer - - -	R. W. Niles.

St. Vincent.—Botanic Station :—

Agricultural Superintendent.	*W. N. Sands, F.L.S.
Assistant Agricultural Superintendent.	S. C. Harland, B.Sc.

Virgin Islands.—Botanic Station :—

Curator (Acting) -	G. A. Gomes.

British Guiana.—Department of Science and Agriculture :—

Georgetown -	Director - - -	Prof. J. B. Harrison, C.M.G., M.A., F.I.C., F.C.S.
	Assistant Director and Government Botanist.	†C. K. Bancroft, M.A., F.L.S.
	Forestry Officer -	C. W. Anderson, I.S.O.
	Horticultural Superintendent.	*R. Service.
	Assistant Gardener -	F. Greeves.
	Agricultural Superintendent.	*Robert Ward.

British Honduras.—Botanic Station :—

Curator - - -	Eugene Campbell.

Jamaica.—Department of Agriculture :—

Director - - -	Hon. H. H. Cousins, M.A., F.C.S.
Travelling Instructor	*William Cradwick.
" "	James Briscoe.

Public Gardens and Plantations :—

Superintendent -	*William Harris, F.L.S.
Superintendent of Experiment Station.	P. W. Murray.

Tobago.—Botanic Station :—

Curator - - - - -	——

Trinidad.—Department of Agriculture :—

Director - - -	Prof. P. Carmody, F.I.C., F.C.S.
Assistant Director and Government Botanist.	W. G. Freeman, B.Sc., F.L.S.
Curator, Royal Botanic Gardens.	——
Horticulturist and Assistant Botanist.	*W. E. Broadway.
Mycologist, Board of Agriculture.	J. B. Rorer, M.A.
Forest Officer - - -	C. S. Rogers.

INDIA.

Botanical Survey of India :—

Director - - - - -	Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.
Economic Botanist - - -	†H. G. Carter, M.B., Ch.B.
Assistant for Phanerogamic Botany	M. S. Ramaswami, M.A.
" " "	P. M. Debburman, B.Sc.

Departments of Agriculture, Botanical Officers attached to :—

Imperial Agricultural Research Institute, Pusa, Bengal :—

Mycologist - - - -	†E. J. Butler, M.B., F.L.S.
Economic Botanist - -	A. Howard, C.I.E., M.A., F.L.S.
Supernumerary Botanist -	——

Bengal Agricultural Department, Calcutta :—

Economic Botanist - -	E. J. Woodhouse, B.A., F.L.S.

Bombay Agricultural Department, Poona :—

Economic Botanist - -	†W. Burns, B.Sc.

Central Provinces Agricultural Department, Nagpur :—

Economic Botanist - -	†R. J. D. Graham, M.A., B.Sc.

Madras Agricultural Department :—

Government Sugarcane Expert, Agricultural College, Coimbatore.	†C. A. Barber, M.A., Sc.D., F.L.S.
Lecturing Botanist - -	K. Rangachari, M.A.
Mycologist - - - -	†W. McRae, M.A., B.Sc., F.L.S.

Departments of Agriculture, Botanical Officers attached to—*continued.*

Punjab Agricultural Department, Lyallpur :—

Economic Botanist - - †D. Milne, B.Sc.

United Provinces Agricultural Department, Cawnpur :—

Economic Botanist - - †H. M. Leake, M.A., F.L.S.

Eastern Bengal and Assam Agricultural Department :—

Economic Botanist - - P. G. Hector, B.Sc.

BENGAL.

Calcutta.—Royal Botanic Garden, Sibpur :—

Superintendent - - - - Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.
Curator of Herbarium - - - †C. C. Calder, B.Sc., F.L.S.
Curator of Garden - - - *G. T. Lane.
1st Overseer - - - - - N. Mitra.
2nd Overseer - - - - - M. Jones.
Probationer - - - - - *G. B. Mould.

Gardens in Calcutta :—

Assistant Curator - - - - *P. V. Osborne.
Overseer - - - - - S. N. Bose.

Agri-Horticultural Society of India :—

Secretary - - - - - S. P. Lancaster.

Darjeeling.—Lloyd Botanic Garden :—

Superintendent - - - - Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.
Curator - - - - - - *G. H. Cave.

Cinchona Department.—

Superintendent of Cinchona Cultivation. — Major A. T. Gage, I.M.S., M.A., M.B., B.Sc., F.L.S.

Mungpoo Plantation :—

Manager - - - - - *P. T. Russell.
1st Overseer - - - - - P. Cresswell.
2nd Overseer - - - - - James Hulbert.

Munsong Plantation :—

Manager - - - - - *H. F. Green.
Assistant Manager - - - - *H. Thomas.
Overseer - - - - - G. Holl.

Dacca (Ramna).—

Arboricultural Expert - - - *R. L. Proudlock.

BOMBAY.

Bombay City.—Municipal Garden :—
Superintendent - - - - C. D. Mahaluxmivala.

Ghorpuri.—Botanic Garden :—
Superintendent - - - - P. G. Kanetkar.

Poona.—Government Gardens :—
Superintendent - - - - *E. Little.

CENTRAL PROVINCES.

Nagpur.—Public Gardens :—
Superintendent - - - - *J. E. Leslie.

MADRAS.

Madras City.—Government Gardens and Parks :—
Superintendent - - - - *W. V. North.
Agri-Horticultural Society :—
Hon. Secretary - - - - L. E. Kirwan.
Superintendent - - - - H. E. Houghton, F.L.S.

Ootacamund.—Government Gardens and Parks :—
Curator - - - - - *F. H. Butcher.

Cinchona Department.—
Director of Cinchona Plantations - W. M. Standen.
Superintendent, Dodabetta Plantation. - H. V. Ryan.
Superintendent, Nedivattam and Hooker Plantations. - E. Collins.

PUNJAB.

Delhi.—Government Horticultural Department :—
Officer in Charge - - - - *A. E. P. Griessen.
Historic and other Gardens :—
Superintendent - - - - *R. H. Locke.

Lahore.—Government Gardens :—
Superintendent - - - - *A. Hardie.
Agri-Horticultural Gardens :—
Superintendent - - - - *W. R. Mustoe.

Simla.—Vice-regal Estate Gardens :—
Superintendent - - - *Ernest Long.

NORTH-WEST FRONTIER PROVINCE.

Agri-Horticulturist - - - *W. R. Brown.

UNITED PROVINCES OF AGRA AND OUDH.

Agra.—Taj and other Gardens :—

Superintendent - - - - *R. Badgery.

Allahabad.—Government Gardens :—

Superintendent - - - - *W. Head.

Cawnpur.—Memorial and other Gardens :—

Superintendent - - - - ——

Kumaon.—Government Gardens :—

Superintendent - - - - *Norman Gill, F.L.S.

Lucknow.—Horticultural Gardens :—

Superintendent - - - - *H. J. Davies.

Probationer - - - - ——

Saharanpur.—Government Botanic Gardens :—

Superintendent - - - - *A. C. Hartless.

Dehra Dun.—Imperial Forest Research Institute :—

Imperial Forest Botanist - - R. S. Hole, F.L.S.

ASSAM.

Shillong.—Government Gardens :—

Curator - - - - - *L. F. Ruse.

NATIVE STATES.

Mysore (Bangalore) :—

Economic Botanist - - - *G. H. Krumbiegel.

Baroda :—

Superintendent - - - - T. R. Kothawala.

Travancore (Trivandrum) :—

Director - - - - - Major F. W. Dawson.

Udaipur :—

Superintendent - - - - T. H. Storey.

Gwalior :—

Director- - - - - - *B. F. Cavanagh, F.L.S.

94